The Magna Project
2024 Excavations

Edited by Rachel Frame and Franki Gillis

With contributions from Dr Fae Amiro, Dr Andrew Birley, Dr Trudi Buck, Dr Cristina Crizbasan, Dr Elizabeth M. Greene, Dr Robert D. McCulloch, Dr Janet Montgomery, Dr Joanna Moore, Dr Tanja Romankiewicz, Dr Hannah Russ, Dr Rob Sands and Dr Gillian Taylor.

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1. INTRODUCTION

DR ANDREW BIRLEY

The 2024 excavations and the interim results that are published within this report mark a significant point in the Magna project and our understanding of what, who, and how this precious landscape has been used in the past. None of this would have been possible without the support of the National Lottery Heritage Fund and the Vindolanda Trust. We must also be extremely grateful to a broad and impressive coalition of partners, many of whom contributed to this report, who have lent their considerable expertise and experience to the benefit of the project and most importantly of all, the fight against the invidious impact of climate change on our historic landscape. One of the great strengths of the project has been the way in which it has created its own inclusive and impressive volunteer archaeological community, attached to, yet quite separate from, the more well established one at nearby Roman Vindolanda. The phrase 'it takes a village' can be translated to 'it takes a cohort' and we are extremely grateful to the hundreds of volunteers who worked through all weathers excavating Roman ditches, a peat bog, wells, and assisting with the vital scientific monitoring and finds processing on the site. The project continued the excellent work of 2023 by finishing work outside the south gate of milecastle 46 before exploring the Roman roads, *vallum*, and ditches to the south (Frame *et al*. 2024). Along the way, the archaeological team discovered the remains of earlier habitation dating to the Iron Age and learned a great deal about the pre-Roman and early landscape of Magna. The analysis of the deep cores taken from the nearby peat bog, between Hadrian's Wall and the fort, revealed that it was truly ancient, and that it started to develop over 6000 years ago. Excavations in the area around a post-medieval well located the 18th and 19th century field drains that had begun to drain the landscape and exposed the Roman occupation and its material remains to erosion and loss.

While the weather, which was often challenging, made excavation of this wet landscape and its Roman ditches a technical feat of engineering, an unexpected story started to develop which has truly changed the way we think about the frontier. Starting with the discovery of the lonely inhumation grave nestled outside the milecastle wall in 2023 (Frame *et al*. 2024: 6), further burial deposits located in 2024 illuminated the slow transformation of this military landscape into a memorial space for the departed. The identification of a funeral pyre, and the research into the basic rites and rituals afforded to a scattering of ashes, from people who started their journeys elsewhere but ended them at Magna, was both humbling and poignant. This discovery reminded us all of what we have yet to know, and the magnitude of what evidence could be lost should the land continue to change, and vulnerable archaeological deposits erode away.

In 2024, the ground monitoring probes recorded their third year of data, with more than two million measurements gathered from the Wall-E probe array and weather station at the site. It can take three or more years to start to be able to sensibly analyse the trends in the data, and unfortunately, the preliminary trends are not promising for the long-term survival of anaerobic deposits at Magna. The air we breathe, including its oxygen content, is continuing to spend longer periods of time penetrating deeply into the soil, which supports the rotting of organic remains. The power of those remains to tell the story of the past, to illuminate and inspire, is perhaps best personified by the recovery of eight Roman shoes from a military ditch at Magna in 2024. While not the thousands of shoes that have come from Vindolanda, each one is precious as, much like the cremations, they make a direct link with the wearer of the shoe. This forms a bridge between people long gone and those who are now tasked with preserving and understanding their legacy.

In 2024, the site of Magna, through the discoveries detailed in this report, came alive. In 2025, the work will move onto the major fort ditches to the north of the last fort built by the Romans at the site. As the excavations and research gets closer to the fort, it moves nearer to the concentration of occupation and therefore daily life. We look forward to sharing the results of that work with you in 2026. We have no doubt that 2025 will further enrich our appreciation of the remarkable history of the people who lived on a border between two very different worlds, one Roman, and one that was not.

2. EXCAVATION RESULTS

RACHEL FRAME

The 2024 season completed the planned excavations in the North Allotment field as part of the Magna Project. Four trenches were opened to investigate the southern extramural area of milecastle 46, the *vallum* diversion and the ditches south of the *vallum* (discussed separately in Chapters 2.2 and 2.3), as well as an ancient lakeside and a well complex.

2.1 EXTRAMURAL AREA OF MILECASTLE 46

Following on from the 2023 excavations, work continued in the extramural area to the south of milecastle 46, expanding the trench to investigate the relationship between the milecastle, the *vallum* and the main fort of Magna (Fig. 1). This section of the report deals with the space between the milecastle's south wall and the line of the Military Way which ran to the north of the *vallum*.

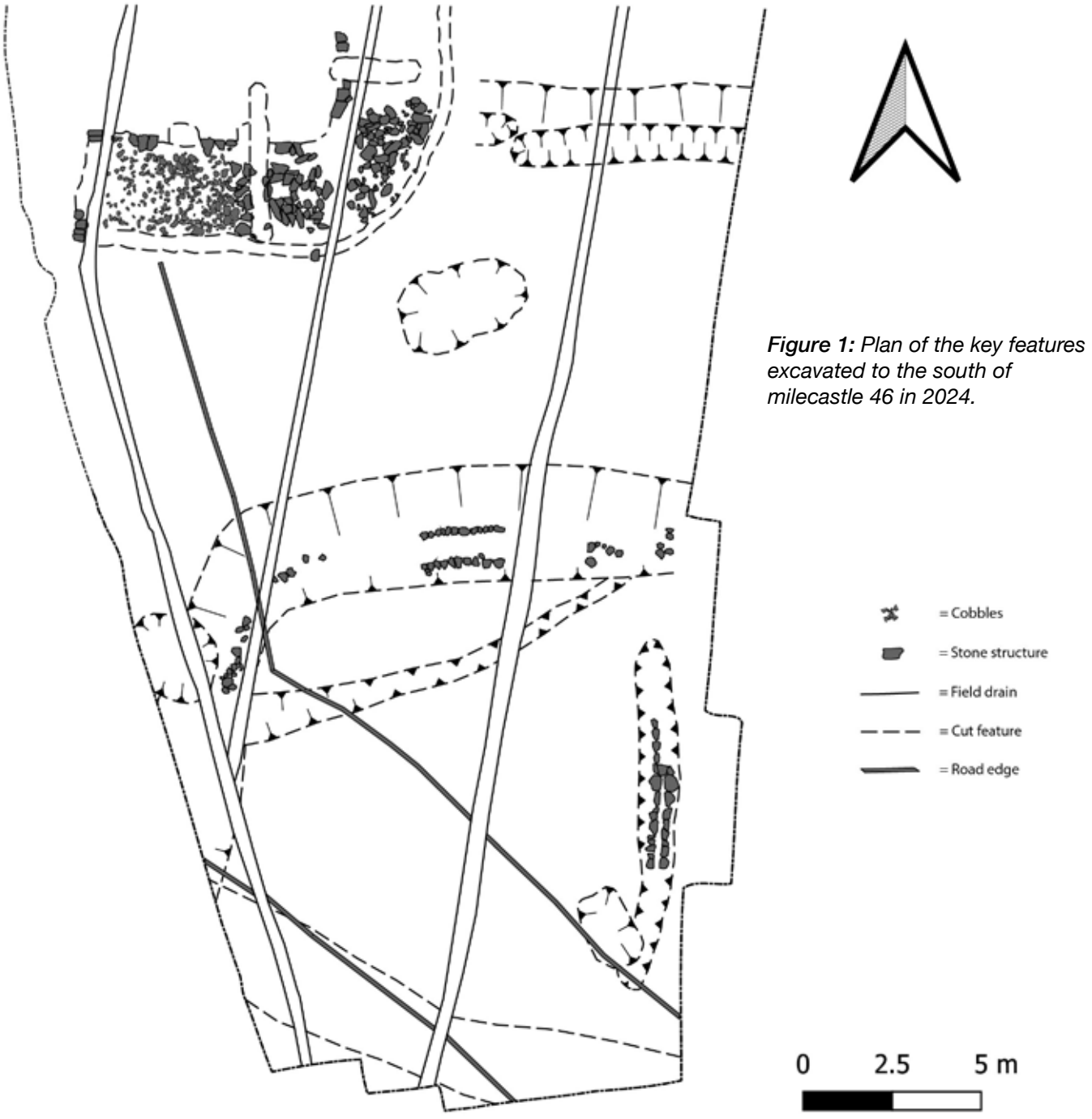

Figure 1: *Plan of the key features excavated to the south of milecastle 46 in 2024.*

2.1.1 MEDIEVAL, POST-MEDIEVAL AND MODERN ACTIVITY

No further archaeological features dating to the post-Roman or medieval periods was recovered in this trench during the 2024 excavations to support the limited evidence uncovered in 2023 (Frame *et al*. 2024: 4). The much more limited activities recorded were linked to the cultivation of the land as part of Carvoran farm in the post-medieval and modern periods (Birley R.E. 1998: 43-47). Of those, three ceramic field drains running N-S were found to have cut through the excavation area (Fig. 1). They formed a part of a much larger drainage network that was initially recorded during the 2023 excavations (Frame *et al*. 2024: 4). Records from the first half of the 19th century suggest that these field drains were installed as part of efforts to improve the land by the Carrick family (Birley R.E. 1998: 56-59).

2.1.2 3RD AND 4TH CENTURY ACTIVITY

The largely cobbled space between the south wall of the milecastle and the Military Way showed relatively little structural change in the 3rd and 4th centuries, suggesting it continued to be in use throughout the later Roman occupation of the site. The necessity for such spaces was also noted within the milecastle during the 2023 excavations, where an earlier well was backfilled to reinstate an open cobbled area in the eastern half of the structure (Frame *et al*. 2024: 5). An earlier stone box drain (see Chapter 2.1.3) went out of use with its final silting up and backfilling occurring during this period. This mirrors events in the extramural area to the east of the milecastle, where a series of large pits were allowed to silt up, indicating less intense use of the space in later periods (Frame *et al*. 2024: 6).

2.1.3 2ND CENTURY ACTIVITY

Much of the activity detected in this area that is dated to the first half of the second century can be associated with the construction of Hadrian's Wall and milecastle 46. This included remodelling the surrounding landscape and backfilling several pre-Hadrianic features (see Chapter 2.1.4) to create a level and open space. The new levelling work allowed for the construction of the road, which started at the south gate of the milecastle, first located in 2023 and dated to the 2nd century by pottery recovered from its surface (Frame *et al*. 2024: 9, 24). Its route was shown to continue along the western edge of the trench, and a secondary road, likely to be the line of the Military Way, was located running in a NW-SE direction across the trench.

Shorter sections of cobbled paths were also uncovered crossing the area between the roads along with the continuation of a large, cobbled yard first encountered during the 2023 excavations (Frame *et al*. 2024: 9). There was no evidence for any buildings, in either stone or timber, associated with the paths and yard, which suggests that this space was not intended for long term occupation but rather temporary use by those travelling through this landscape.

A stone box drain was uncovered at the eastern edge of the trench, likely dating from the 2nd century based on pottery recovered from within its fills (see Chapter 11.3.2). The drain had been laid in a N-S running ditch and was bordered to its west by a short section of cobbled pathway. Unfortunately, the purpose of this drain remains unclear due to the lack of associated structures and its position on one edge of the excavated area. One possibility is it may have been intended to channel water away from the cobbled yard located immediately to the north, to prevent the area from becoming boggy in wet weather.

2.1.4 PRE-HADRIANIC ACTIVITY

The arrival of the Romans seems to have brought an abrupt end to the earlier occupation of the site. An Iron Age enclosure ditch (see Chapter 2.1.5) was backfilled and any potential rampart was levelled to create a blank slate for the Roman army, though what happened to the pre-existing community remains unknown.

A short section of a Roman military ditch was uncovered immediately to the east of the milecastle, aligned E-W and continuing east beyond the limit of excavation (Fig. 2). The ditch had a V-shaped profile with a steep southern side, while the northern side was stepped, emulating the appearance of an 'ankle breaker' (see Chapter 2.3.4 for further discussion of this feature). These characteristics resemble those excavated at Roman marching camps in northern Britain, such as at Dunning and Dalginross, where the defensive ditches had steep sides and a V-shaped profile, often with an 'ankle breaker' at the base (Rogers 1993: 281-283; Campbell *et al*. 2014: 9-11, 18-19). It may be that the ditch outside milecastle 46 is associated with a hitherto unknown marching or temporary encampment that pre-dated the construction of Hadrian's Wall.

***Figure 2:** The pre-Hadrianic military ditch to the east of milecastle 46, post-excavation.*

Several large pits dating to the pre-Hadrianic Roman period were also excavated. The purpose of these pits is currently unclear, as they contained very little artefactual material and the ecofactual evidence was inconclusive; however, they may be related to the presence of an early encampment. The presence of wet, silty deposits in the base of the pits suggests that they remained open for some time after they were dug and likely had standing water in them. Pits associated with marching camps have often been interpreted as ovens, but there are examples of other miscellaneous pits both inside and outside camp defences (Jones 2012: 98-101).

Other features dating to this period included a narrow gully running NW-SE across the area. This cut across an earlier curvilinear ditch (see Chapter 2.1.5) and became wider and deeper at its western end, matching the topography of the site which slopes downhill to the west. This was likely to have been used as a drainage gully, though what it was channelling water away from remains uncertain and likely lies to the east of the excavated area.

2.1.5 PREHISTORIC ACTIVITY

Prehistoric remains were limited to a single large feature dating to the Iron Age, as confirmed by a sherd of Iron Age pottery recovered from its upper fill, which survived below the 2nd century cobbled yard. A shallow curving ditch was found to extend across the full width of the excavated area, forming the northwest corner of an enclosure (Fig. 3). This was probably the perimeter ditch for an enclosed farmstead, like those recorded elsewhere in the Northeast at sites such as Burradon (Jobey 1970), Belling Law (Jobey 1977) and West House, Coxhoe (Haselgrove and Allon 1982).

***Figure 3:** The Iron Age enclosure ditch to the south of milecastle 46, post-excavation. Image captured from a 3D scan.*

The ditch cut was best preserved at the eastern edge of the site, where it had a maximum depth of 0.4m, however it had likely been truncated as well as backfilled in antiquity (see Chapter 2.1.4) resulting in only the base of the cut surviving relatively intact. Remains of a double row of stones were found in several places along the inner side of the ditch. These may indicate the presence of an internal rampart or wall with stone facing accompanying the ditch, as was the case at Belling Law where the phase III perimeter featured an inner and outer bank, both faced with undressed stone (Jobey 1977: 8-10).

2.1.6 UNCERTAIN FEATURES AND FURTHER WORK

The date and function of most of the features uncovered in this trench have been identified. However, some remain more challenging to interpret. To the east of the stone box drain (see Chapter 2.1.3), two postholes were cut into an E-W orientated gully, and a N-S orientated gully located to the south of this was also uncovered (Fig. 4). Based on stratigraphic evidence, these are likely to date to the later Roman period, but their purpose remains unclear as they do not form a clear footprint for a structure and both gullies extend beyond the limit of excavation, hampering their interpretation.

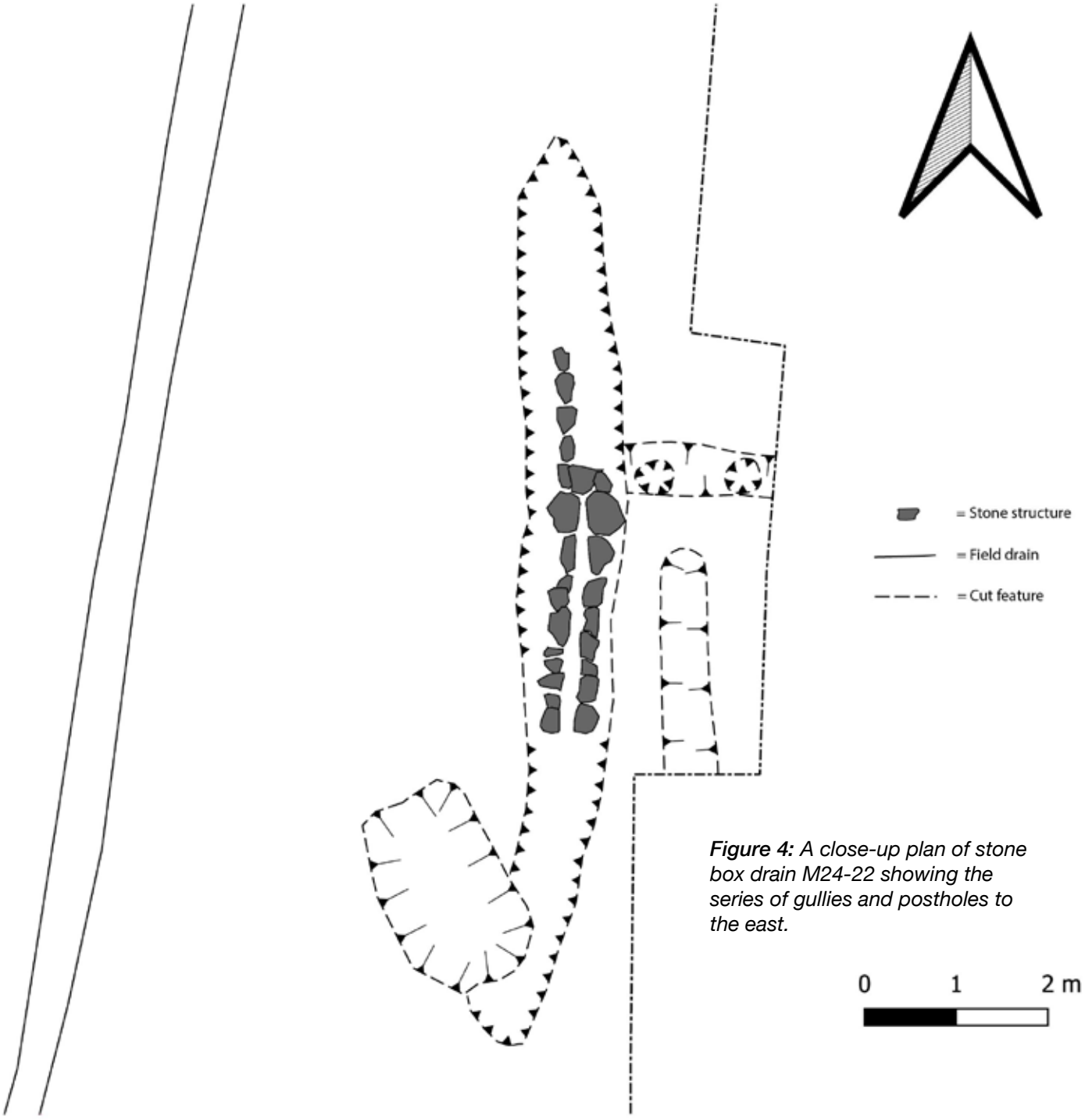

Figure 4: *A close-up plan of stone box drain M24-22 showing the series of gullies and postholes to the east.*

An irregular, sub-oval pit recorded in the southeast corner of the trench, at the south end of the cut for the stone box drain, also had no clear function or relationship with the surrounding archaeological features. The main fill of this pit was like the surrounding boulder clay and this, along with the irregularity of the cut, suggests it was more likely to have been a geological feature rather than an archaeological feature.

2.2 *VALLUM* AREA

The second trench excavated during the 2024 season was 70m long and crossed two distinct areas of archaeology. As such, the results will be discussed in two halves: here and in Chapter 2.3. The northern end of the trench was centred on the ***vallum*** and excavated a section across both the ramparts and ditch to investigate the construction of the earthwork (Fig. 5). The location of the trench along the western edge of the field was chosen to locate the ***vallum*** crossing point for the road between Magna fort and milecastle 46. Excavations of the *vallum* were hampered by consistent flooding, which led to the collapse of the east section. Nonetheless, a 3.0m wide section was successfully excavated.

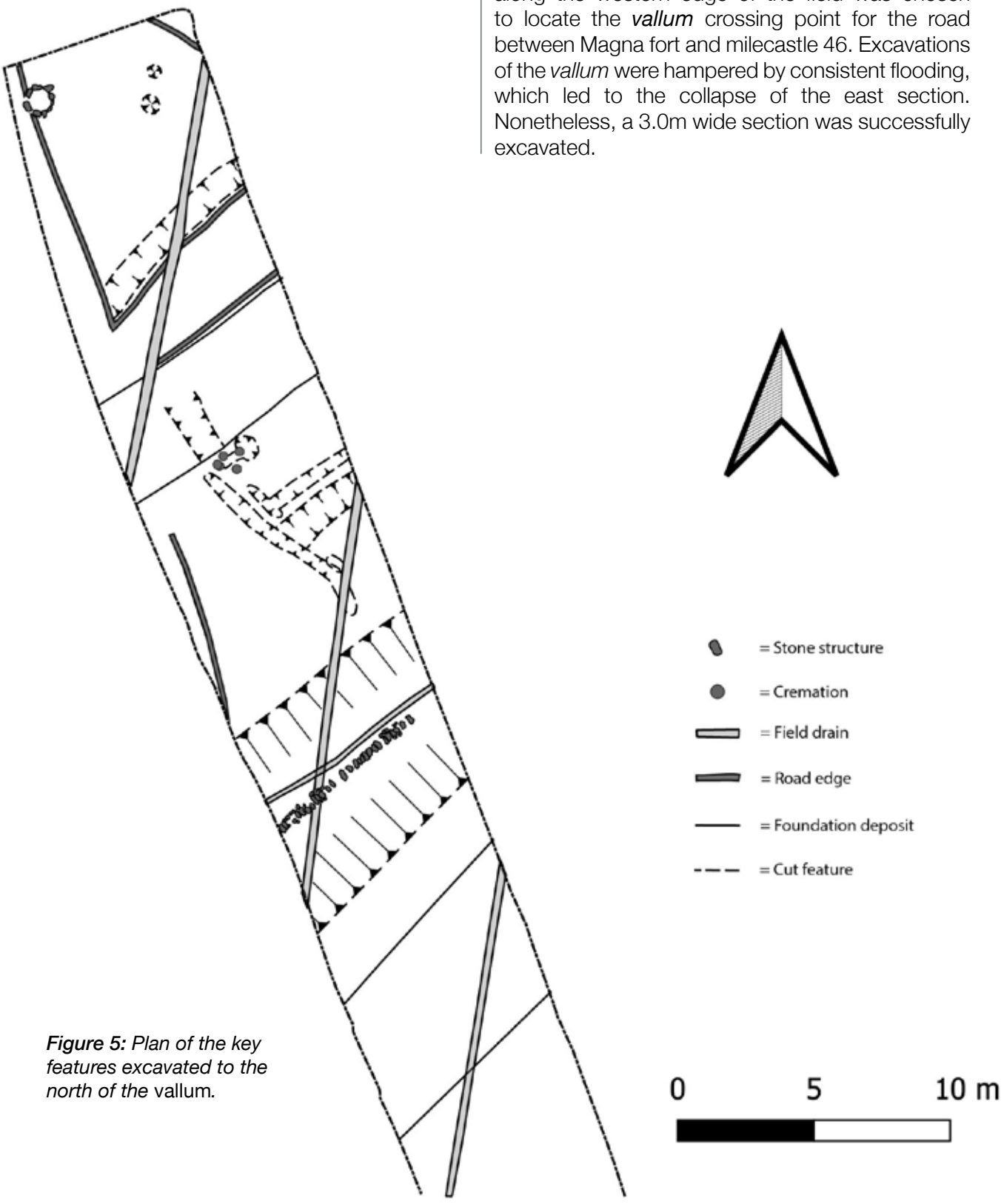

Figure 5: *Plan of the key features excavated to the north of the* vallum.

2.2.1 MEDIEVAL, POST-MEDIEVAL AND MODERN ACTIVITY

Beyond the already discussed network of ceramic field drains (see Chapter 2.1.1), there was little sign of later activity in this part of the site. Further efforts to improve the land for agriculture were evident within the fills of the *vallum*. Additional drains had been inserted into the upper fills, running NW-SE down the centre of the ditch. These were likely intended to provide additional drainage to the lower lying and wetter area of the field formed by the infilled ditch, while also taking advantage of the route of the *vallum* to channel water downhill to the west and out of the field. The drains were a mixture of ceramic pipe sections, and, at one level, a stone-built and capped drain.

The bulk of the material within the ditch proved to be intentional backfill dating to the post-Roman periods and is likely associated with levelling the field for agricultural use. One context, below the level of the post-medieval drains, was formed primarily of degraded turf blocks preserved by waterlogging. Given the poor survival of the turf mounds to the north and south of the ditch (see Chapter 2.2.3), this represented the remains of the mounds which were pushed into the ditch to improve the field for ploughing.

One notable absence from the infill of the excavated section was the whinstone chippings known to have been dumped in the *vallum* in the mid-20th century (Birley R.E. 1998: 83). Based on these excavations the chippings are only present to the east of the bend in the *vallum*. This interpretation aligns with both the coring done in 2021, which encountered the chippings at *c*. 2.0m depth (Birley Andrew R. *et al*. 2021: 11), and the geophysical survey results from 1999 (Fig. 6). These show a stronger and 'noisier' reading in the eastern section of the *vallum* (Biggins and Robinson 2000: Figure 12) which may have been caused by the presence of the whinstone.

2.2.2 3RD AND 4TH CENTURY ACTIVITY

Between the 3rd century and later Roman activity, major changes took place in the use of space in this area. Several earlier features including the *vallum*, roadside ditch and stone-lined well (see Chapter 2.2.3) began to fall out of use and were allowed to silt up. Within the *vallum*, artefacts including Roman roof tiles were recovered from these deposits. These suggest that a nearby structure had a tiled roof, possibly a barrack block in the unexcavated western half of milecastle 46 but also potentially the turret over the milecastle gates. This style of turret or watchtower can be seen in depictions of Roman walls on Trajan's column and would be better suited to the British weather than a flat, flagged roof (Breeze and Dobson 2000: 37). The tiles also may have fallen from a passing wagon, either using the road from the fort to the milecastle or the Military Way, which unintentionally shed some of its load into the ditch. The well and the roadside ditch also saw periods of deliberate backfilling, with the upper fill of the ditch containing a diverse ceramic assemblage (see Chapters 11.3.2 and 11.4).

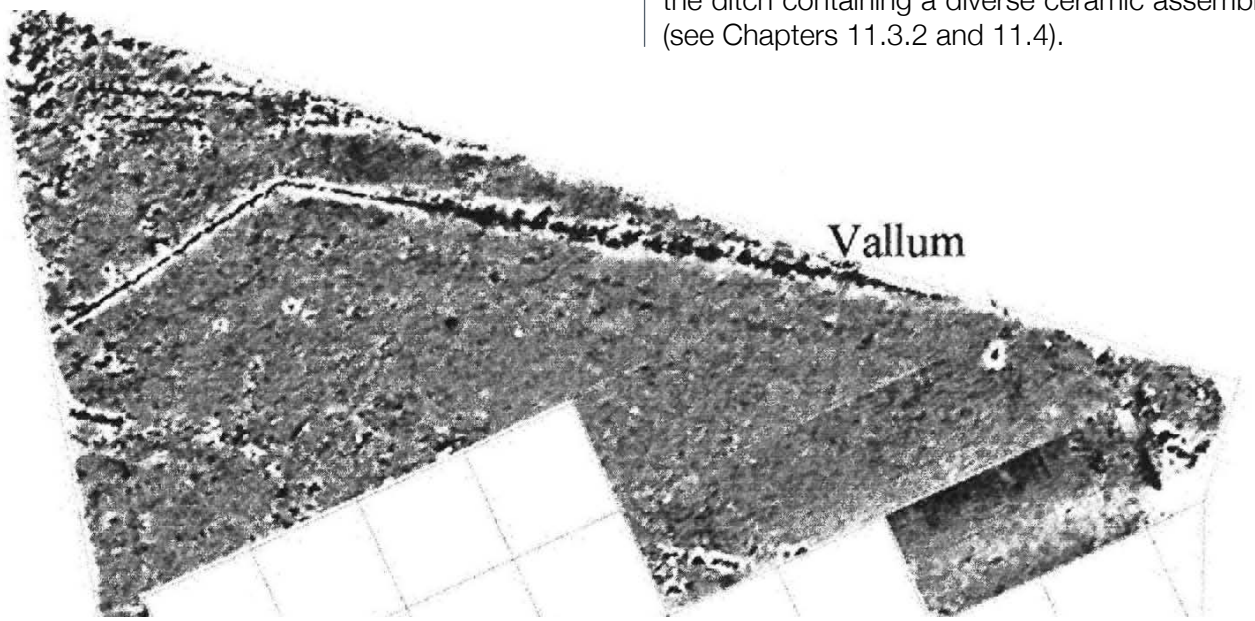

***Figure 6:** Geophysical survey results of the* vallum *shown as a greyscale magnetometry plot (Biggins and Robinson 2000).*

Further evidence of the changing use of space was found on the north berm of the *vallum*. Here, a series of small gullies had been dug into the natural clay, some of which cut the north side of the *vallum* and were likely intended to channel water into the ditch. Alternatively, two of these gullies which intercut one another to form a 90-degree corner may have been beam slots for a timber building or fence, an interpretation supported by the discovery of a piece of charred wood in the base of one of them (Fig. 7).

Immediately to the south of the potential beam slots, a larger boundary ditch was uncovered on the *vallum's* north berm which continued to the east beyond the limit of excavation. This may form part of a wider funerary landscape identified during the excavations (see Chapter 2.6.2). Cut into the edge of the north mound was a cluster of four cremation burials along with a larger pit of cremated remains. All four burials were in very close proximity to one another, in some cases almost intercutting, but were individually identifiable as discrete sub-circular deposits of bone, charcoal and ash. This indicates that the remains had originally been placed in containers which were likely made of an organic material such as cloth or leather. The cremated remains within the large pit represented material from multiple cremations and had been deposited over time, as demonstrated by concentrations of bone and burnt wood occurring in discrete areas of the general fill. This material was most likely debris cleaned from the pyre after the cremation and burial rites had taken place (Polfer 2000: 30).

Full analysis of the cremated remains is provided by Dr Trudi Buck, Dr Janet Montgomery and Dr Joanna Moore of Durham University in Chapter 5.

2.2.3 2ND CENTURY ACTIVITY

In addition to the road network investigated in the vicinity of milecastle 46 (see Chapter 2.1.3), further sections of road were unearthed to the north of the *vallum*. The remains of the Military Way, the road which ran along the frontier between Hadrian's Wall and the *vallum*, were badly degraded with only loose patches of cobbling present. The presence of the road was better defined by the survival of a roadside ditch along its northern edge, while the south side was demarcated by the northern turf mound of the *vallum*.

Very little of the road linking milecastle 46 to Magna fort was within the boundary of the excavations, due to the conflicting trajectories of the buried road and

***Figure 7:** A piece of charred wood found in the base of a gully, which may have formed part of a building or fence.*

the modern field wall which dictated the position of the trench. Only a thin strip of cobbling in the northwest corner of the trench attested to the line of the road, indicating that the crossing point over the *vallum* would lie further to the west underneath the field wall. Immediately adjacent to the road edge, a stone-lined well (Fig. 8) was discovered which had been positioned at the junction between the Military Way and the route to Magna. This would have provided a source of water for individuals and their animals travelling through the region. It would have been of particular use due to its location at a crossroads, which are known to have been used as meeting points and landmarks in the Roman period (*Tab. Vindol*. 628).

Figure 8: *Profile of the stone-lined roadside well. Image captured from a 3D scan.*

A similar arrangement can be seen at Vindolanda, where a cluster of wells and settling tanks were excavated at the western edge of the site in 1973. Although the largest well is deeper than the example found at Magna, no doubt due to differences in the water table, the stone-lined construction and width are broadly comparable (Birley R.E. 1977: 60, Plate 21). These have since been proven to also sit at a crossroads, where two of the roads from the extramural settlement meet at the edge of the settlement (Birley Andrew R. and Alberti 2021: 7). The well at Magna produced only one sherd of Roman ceramic (see Chapter 11.3.2) and a single glass bead (MSF37) which came from its primary fill.

There were no upstanding remains of the *vallum's* turf ramparts to the north or south of the ditch, but the clay foundations of both mounds survived *in situ*, along with the probable remains of the south marginal mound. These provided an indication of the size of the mounds as well as the overall earthwork. The northern foundations were more substantial and, when excavated, revealed individual lozenges of clay within the foundation, demonstrating how it was constructed. Samples from both the north and south mounds underwent micromorphological analysis to shed further light on the construction methods (see Chapter 9).

Figure 9: *East facing section of the* vallum*, post-excavation.*

Within the *vallum*, stepped excavations uncovered the full profile of the ditch which had a rounded base and steep sides with an overall depth of 1.93m and width of 8.9m at the top (Fig. 9). This is slightly wider than sections excavated by Brenda Swinbank further to the east in the North Allotment field, who found the cut to be roughly 23 feet (7m) wide (Swinbank 1953: 88). The primary fills of the *vallum* consisted of a thin layer of highly organic waterlogged soil, which likely formed immediately after the ditch was dug as organic material washed into the ditch, overlaid by redeposited boulder clay which had slumped into the base. This slumped material would originally have formed the upper edge of the ditch cut; this was eroded away over time to create the profile recorded during the excavation and implies that the original cut would likely have been deeper and had steeper sides.

2.2.4 PRE-HADRIANIC ACTIVITY

Features dating to the early Roman occupation of the site were limited in this area, with only two small pits being found at the northern end of the trench. Both pits had been covered by the later road network and contained occasional sherds of Roman pottery, providing an indication of their date. The two were closely related and arranged on a N-S alignment and had comparable dimensions, though the southern one was slightly larger. Their purpose was unclear, but given their location near the north edge of the trench they may relate to features beyond the limit of the excavation (Fig. 10).

In some places, notably below the remains of the *vallum's* turf mounds, sections of the historic ground surface were found to be preserved and were sampled for micromorphological analysis (see Chapter 9).

2.2.5 UNCERTAIN FEATURES AND FURTHER WORK

Further south, in the space between the south *vallum* mound and the double ditches discussed below, a series of smaller ditches were recorded underlying a broad swathe of silt dating to the 4th century. These included a ditch running E-W and a shallow curving ditch which extended beyond the trench to the east (Fig. 11). Stratigraphic evidence would suggest that they date to the prehistoric period, but this cannot be confirmed as they had all been truncated to varying degrees in antiquity. This fact, combined with the lack of material culture, limits any further interpretation of these features.

Figure 10: *West facing sections of two pre-Hadrianic pits excavated north of the* vallum.

2.3 DOUBLE DITCHES

The southern end of the trench targeted two ditches (Fig. 11) running E-W that were visible pre-excavation as depressions under the turf. Neither of these had been previously recorded within the landscape due to the overlying peat bog. However, as the peat had desiccated and shrank over the past decade, the ditches became visible within the landscape once more.

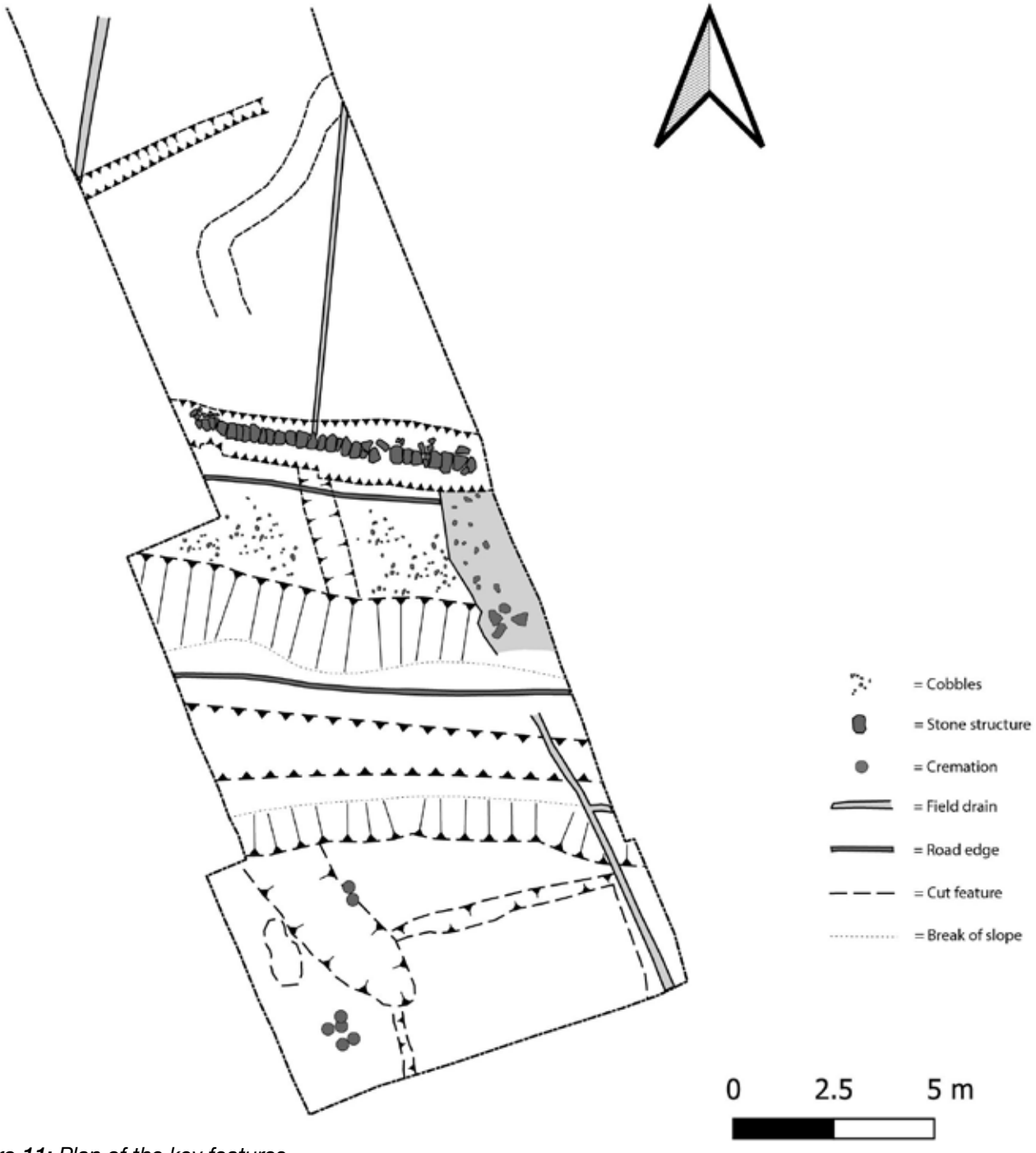

Figure 11: *Plan of the key features excavated to the south of the* vallum.

2.3.1 MEDIEVAL, POST-MEDIEVAL AND MODERN ACTIVITY

Of the two ditches, the northern one was significantly smaller in both width and depth and proved to be the cut for a post-medieval drain. This had been built of stone and was more substantial than the ceramic drains recorded across the rest of the excavated areas, and the smaller stone lined drain within the *vallum*. The sides were of drystone construction and contained at least two courses, while unworked boulders had been used as capping stones (Fig. 12). The drain was still functional when excavated and so was not disturbed further once exposed.

2.3.2 3RD AND 4TH CENTURY ACTIVITY

No major shifts in the use of this landscape occurred throughout the 3rd and 4th centuries, with the burial of further cremations continuing the funerary traditions of the 2nd century (see Chapter 2.3.3). This brought the total number of burials within the excavated area to seven. Five of these were placed near one another, in the southwest corner of the trench, while the remaining two had been buried on the east edge of the associated pyre. Based on radiocarbon dating, the pyre site appears to have been in use throughout the cemetery's lifespan, with the earliest date given as cal. 234 CE and the latest possible date being cal. 381 CE (see Appendix 6).

The backfilling of the pre-Hadrianic ditch (see Chapter 2.3.4) continued throughout the 3rd and 4th centuries as evidenced by the diversity of finds, particularly ceramics, recovered during the excavations (see Chapter 11.5.1). Following this, a cobbled road running E-W was laid immediately to the north of the southern ditch. Its southern edge partially overlay the backfill of the ditch while the northern edge had been truncated by the post-medieval field drain (see Chapter 2.3.1). The construction of this road mirrors that of the roads excavated further to the north, with river cobbles set into a clay bed. However, its purpose remains unclear as no associated structures or occupational features were identified during the excavations.

Figure 12: *Substantial post-medieval stone drain immediately north of the pre-Hadrianic military ditch.*

2.3.3 2ND CENTURY ACTIVITY

During the 2nd century, the use of this area appears to have shifted away from the military functions of the pre-Hadrianic occupation (see Chapter 2.3.4); the earlier defensive ditch was no longer maintained, and it was instead used as a rubbish dump. Further evidence of its abandonment can be seen in the large amounts of unworked silver birch wood found within the fills, along with an area of rooting on the north side of the ditch, which indicate a copse of trees growing within the cut. This period of relative abandonment is further supported by palynological evidence which has identified several tree species in the vicinity (see Chapter 8).

South of the ditch, the focus shifted to funerary activity where an oblong pit was dug to contain a pyre associated with a series of cremation burials. Around the same time, a clay platform was constructed to the west of this, into which cremation burials were placed. The first burial in this area, dated to cal. 110-236 CE (see Chapter 5 and Appendix 6), was likely to have been a box burial with the remains found in a square cut accompanied by fragments of wood. The cremations in this group were of similar character to those excavated north of the *vallum*, consisting of small sub-circular deposits of bone and ash probably buried in organic containers. Based on these similarities, it is likely that they formed part of one dispersed cemetery in the area (see Chapters 2.6.2 and 5).

Full analysis of the cremated remains is provided by Dr Trudi Buck, Dr Janet Montgomery and Dr Joanna Moore of Durham University in Chapter 5.

2.3.4 PRE-HADRIANIC ACTIVITY

Activity during the early Roman period was centred on the southern of the two ditches, which was significantly larger, measuring 7.19m wide and nearly 2.0m deep. Its construction can be securely dated to the pre-Hadrianic Roman period based on the ceramic assemblage within its primary fill (see Chapter 11.5.1). The size of the ditch would suggest either a military and defensive use for this feature or a hybrid of defensive and engineering functions, with the former interpretation supported by the discovery of an 'ankle breaker' cut into the base (Fig. 13). These were square slots dug into the bases of ditches as additional defensive measures; an attacker trying to scramble across the ditch would instead fall into the slot and likely break their ankle.

Figure 13: *West facing section of the pre-Hadrianic military ditch during excavation. Note the ankle breaker in the base has flooded.*

The ditch can be associated with the pre-Hadrianic fort at Magna and may have formed part of an annexe added to its northern edge. It was unlikely to have been part of the defences for the main fort as fossil pollen analysis of samples from within the fills indicated limited occupation in the vicinity of this ditch (see Chapter 8). After the initial construction of the ditch, it was cleaned out and recut, indicating at least two phases of use. This recut did not extend to the limits of the original dimensions or the 'ankle breaker' in the base, instead making a smaller, U-shaped ditch which then filled over time (see Chapters 2.3.3 and 11.5.1).

Both the primary and secondary fills of this ditch were fully anaerobic, meaning they had little to no oxygen, which preserved organic artefactual and ecofactual remains (see Chapters 4, 8, 9 and Appendix 2).

To the south of the ditch were a series of shallow gullies forming three sides of a rectangle extending beyond the limit of excavation. Although truncated by later features, these are likely to represent beam slot foundations for the walls of a timber building. The existence of such a structure nearby is supported by the recovery of timber building materials from the anaerobic fills of the ditch, including fallen wattle and well preserved, thin wooden planks made from oak (Fig. 14; see Appendix 9) which may have been used as cladding on the outside of the building. No evidence for the function or occupation of this potential building survived within the excavated area, but cereal pollen found within the primary ditch fill (see Chapter 8) could suggest the storage, use or processing of grain as a potential use.

2.4 NORTHERN BOG AREA

The aim of this trench was to investigate the possible continuation of the double ditches discussed above and assist in defining the northern limit of the ancient lakebed (now covered by the peat bog) discovered to the south (Fig. 15). Attempts to locate further sections of the large ditch were unsuccessful, proving that it did not extend as far to the east as originally thought. The deposits in the southern half of the trench were noticeably peatier than those to the north. This observation suggests that this area represented the northernmost extent of the peatland bog and was perhaps, historically, beyond the shores of the ancient lake.

Figure 14: *One of three oak planks found within the pre-Hadrianic ditch.*

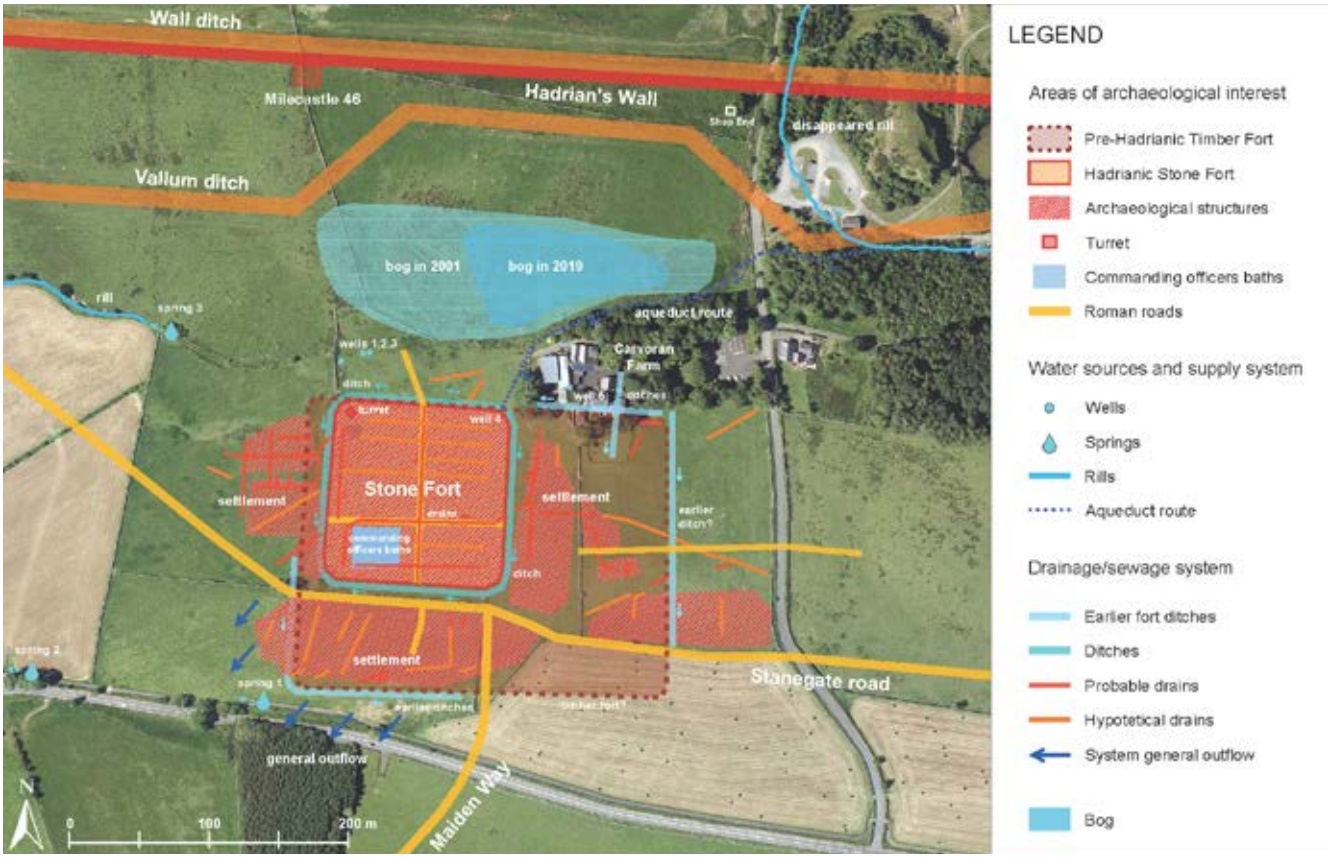

Figure 15: *Hydraulic systems map of Magna, showing the extent of the peat bog that now covers an ancient lakebed (Guiney* et al*. 2021: 9).*

2.4.1 MEDIEVAL, POST-MEDIEVAL AND MODERN ACTIVITY

Activity dating to the post-medieval and modern periods was consistent with that found across the North Allotment field and related to the agricultural activity of Carvoran farm. Two ceramic field drains, one running N-S and the other E-W, were encountered within the excavated area (Fig. 16). In addition, a small linear feature of packed rubble was recorded, having been cut into the subsoil on a N-S alignment. Given the lack of rubble drains elsewhere on the site and the shallow depth of the feature, it is likely this was the footing for a small drystone wall, possibly for some kind of animal enclosure.

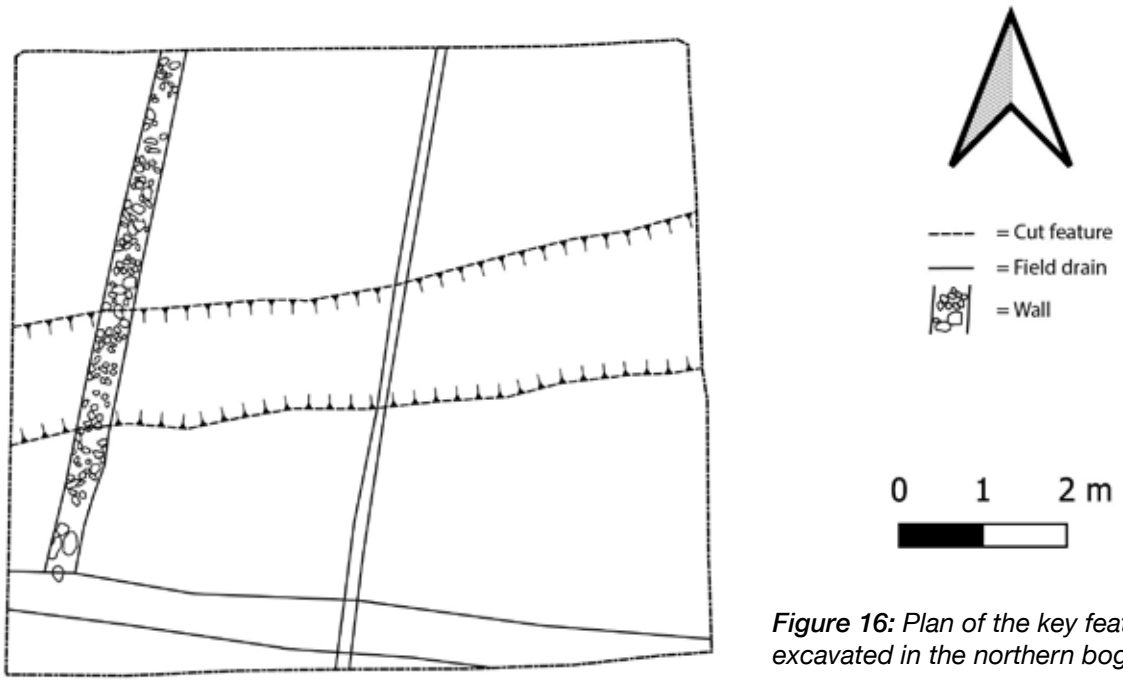

Figure 16: *Plan of the key features excavated in the northern bog area.*

2.4.2 2ND CENTURY ACTIVITY

Very limited evidence for Roman activity was recorded in this trench. The upper fill of a shallow ditch produced occasional sherds of Roman pottery (see Chapter 11.3.2); however, no Roman features were recorded in the area. This absence, along with the very low volume of pottery, suggests that there was no occupation in this area during that time and instead the finds are incidental and may have originated from elsewhere on the site.

2.4.3 PREHISTORIC ACTIVITY

The only other feature of archaeological origin within the excavated area was a shallow, flat-based ditch running E-W through the trench (Fig. 16). This had been cut through the lowest deposit of hill-wash and contained two fills. The upper fill contained occasional pieces of Roman pottery (see Chapter 2.4.2), but these are most likely redeposited rather than indicating a Roman date for the feature. Overall, the shape in profile of this ditch is comparable to prehistoric ditches excavated elsewhere during the season (see Chapters 2.1.5 and 2.2.5). The shallow sides and flat base of this ditch mean it would not have functioned as a defensive or enclosure ditch, but it may have been a visual marker of a boundary in the landscape. It may also have been used for water management due to its location on the northern shore of the ancient lake. Archaeobotanical analysis revealed the presence of flea sedge, sedge, and water blinks seeds, as well as an abundance of amorphous organic material (see Chapter 6.2.3). These plant remains correlate with the nearby wetland, and the dating of the bog to approximately 4800 BCE (see Chapter 10).

2.5 WELL COMPLEX

The focus of this trench was a stone lined well in the centre of a raised mound which was over 1.0m higher than the surrounding landscape (Fig. 17). This was only identified as an area of interest in recent years since the well was not visible prior to the shrinkage of the surrounding peat bog.

The area surrounding the well was also excavated, to investigate any associated occupation and the formation and health of the peatland bog (Fig. 18). Due to extensive flooding from broken field drains and the wet summer of 2024, it was not possible to conclude the excavation of the southern half of this trench.

Figure 17: *The well mound pre-excavation.*

Figure 18: *Plan of the key features excavated around the well complex.*

2.5.1 MEDIEVAL, POST-MEDIEVAL AND MODERN ACTIVITY

Most of the features encountered during the excavation were found to date to the post-medieval and modern period and can be linked to the occupation of Carvoran farm. The most recent phase of this activity included the burial of modern farming waste in pits dug into the south side of the well mound, likely in the mid-20th century. In addition, the final backfilling of the well took place at this time, using whinstone chippings acquired from the neighbouring Walltown quarry in 1948 (Birley R.E. 1998: 83).

Prior to this, several changes had been made to this part of the field in the 18th and 19th centuries, relating to different uses of the land. The network of ceramic field drains located in all other trenches in the North Allotment field was also uncovered in this area, with drains oriented both N-S and E-W crossing the trench. The E-W drains form part of a network feeding a series of water troughs to the east of the trench, contained within a three-sided walled area (see below). This can be securely dated to the late 1800s by its absence from the 1st edition Ordnance Survey (OS) map (1865) and subsequent appearance on the 2nd edition OS map (1898). The shallower N-S drains had buckled and moved because of the shrinkage of the peat they had been laid into and were thus found very close to the current ground surface. These upper layers of peat contained primarily post-medieval pottery, glass and pipe stems which confirm the formation date for the uppermost layers of the bog.

Investigations of the well itself confirmed that it dated to the post-medieval period; however, it was not possible to safely excavate the full depth of the well shaft and excavations were ceased at a depth of 4.15m.

Despite this, details of the methods used in its construction were revealed by the excavations. An initial square construction cut was dug through the bog and underlying boulder clay, before a timber frame, preserved in its lower levels by the peatland bog, was inserted to brace the sides of the cut during construction (Fig. 19). This was formed of layers of large horizontal cross beams, one on each side of the cut, placed roughly every 0.5m and supported by several smaller vertical timbers between each layer. The wood had been stripped of its bark and some timbers showed signs of having been worked at the ends to form joints.

The wall of the well was a coursed drystone structure with roughly dressed inner facing stones constructed in the centre of the shaft (Fig. 20). Although minimal evidence for the reuse of Roman stone was observed in the well, at least one potential stone roof slate was discovered, and it is likely that the builders made use of the easy stone resource presented by the Roman remains. The space between the stone well and the walls of the construction cut was then backfilled, and this

Figure 19: *The timber frame used to brace the construction cut for the post-medieval well.*

Figure 20: *The lower section of the drystone well shaft, post-excavation. Image captured from a 3D scan.*

included a high volume of post-medieval pottery, glass and clay pipes likely representing the domestic waste from Carvoran farm and confirming the date of the well.

The surrounding mound material was found to be redeposited boulder clay, most likely excavated from the well shaft during its construction. Though it showed no signs of deliberate construction, it would have acted as additional support for the upper portion of the well shaft while also improving access to the well across the boggy ground. Furthermore, it had unintentionally formed a protective capping on the peat below, resulting in less damage to these deposits (see Chapter 2.5.2).

Further improvements to the access from the farm to the well were found in the form of a roughly cobbled path extending down the south side of the well mound and across the southern half of the trench. This was formed of uneven, tightly packed cobbles, rubble and farm waste, including bricks and post-medieval pottery. The path overlays the foundations of an earlier stone wall which ran along the southern edge of the trench. No wall is recorded in this area on early maps of the site, suggesting this was never a longstanding feature of the site. It may have been a low wall surrounding an extension of the farmyard or a kitchen garden rather than that of a building or permanent field boundary.

Alongside the excavation of this trench, the clearance of overgrown vegetation along the south edge of the field revealed an impressive water tank system (Fig. 21). It featured three salt-glazed troughs from Bardon Mill along one edge of a trapezoidal enclosure which appeared to have made use of Roman masonry blocks in its construction. A floor of high-quality flagstones had been laid within the enclosure, bordered by a neat band of cobbling. These flags may well have been obtained from the antiquarian excavation inside the fort before "Mr Carrick…removed entirely the remains of the bath…" (Hodgson 1840: 292); the excavation of Area C in the final two years of the project will shed further light on this.

Figure 21: *Aerial photo of the water tank enclosure to the east of the well complex.*

2.5.2 3RD AND 4TH CENTURY ACTIVITY

In comparison to the extensive evidence for later use of the area, there was little Roman occupation or activity found within the peat bog. An intermediary layer of peat, containing both Roman and later ceramics, was excavated across the site. This lay below the depth of the ceramic field drains (see Chapter 2.5.1) and had consequently suffered less desiccation than the overlying deposits. Within this layer some areas of degraded turf were found, particularly where it underlay the clay mound surrounding the well, indicating that this later capping of clay had reduced the degradation of the peat.

2.5.3 2ND CENTURY ACTIVITY

Deeper deposits of peat dating to the Roman period, and containing exclusively Roman finds, were found to have been better preserved. Within these, large sheets of silver birch bark were uncovered, having been removed from trees and laid flat on the historic surface of the bog (Fig. 26). In close association with these, several discrete deposits of presumed horse manure were also recorded (Fig. 22). Further analysis of environmental samples taken from these will aim to confirm the exact nature of this material. The presence of these materials suggests some level of activity in this space during the 2nd century, though the nature of this is hard to ascertain and lack of associated structures suggests it was only short-lived (see Chapter 2.6.3 for further discussion).

The only other features present in this layer were a small square of laminated flooring, of the kind seen in the early timber forts at Vindolanda (Birley Andrew R. and Blake 2007: 67), along with two upright timber posts discovered in the southwest quadrant of the trench. Further investigation of these was prevented by flooding (see Chapter 2.5) but these may represent the remains of a small temporary structure or working platform.

Figure 22: *The 2nd century peat deposits surrounding the well. The lighter brown deposit in the foreground is presumed horse manure while the silver birch bark can be seen in the corner of the trench behind it.*

A small number of finds including bone, ceramic building material (CBM) and Roman pottery (see Chapter 11.3.2) were also recovered during the excavations. The small number of finds may be related to the low intensity of activity in the area but can also be attributed to the preservation conditions within the peat itself. Many of the ceramics recovered were noted to be very soft and undergoing delamination or flaking of their surfaces which is likely the result of being buried within a wet and acidic environment (Buys and Oakley 2014: 27-28).

2.5.4 UNCERTAIN FEATURES AND FURTHER WORK

The full depth of the peat bog was established to be 1.17m in the northwest corner of the trench and was found to sit on top of the natural boulder clay in this area (Fig. 23). The date for the primary peat deposits investigated in this area could not be established with any certainty, however a small number of timber posts were uncovered at the base of this deposit, suggesting it was forming during early occupation of the site.

2.6 DISCUSSION

The discoveries made during the 2024 season have provided answers to key research questions, as well as raising new questions and avenues for further research. Three of these areas of research will be discussed in more detail below: the diversion of the *vallum*, the cremation cemetery, and potential tanning activity.

2.6.1 THE *VALLUM* DIVERSION

A key feature of the *vallum* at Magna is the sudden diversion of the earthwork to the north as it approaches the fort, causing it to run near Hadrian's Wall for around 360m (Fig. 24). This unusual route is unique along the length of the Wall; other comparable diversions can be observed, but they are generally to the south of a fort to include it in the Wall zone, such as at Birdoswald (Swinbank 1954: 172). Potential reasons for this alteration have been discussed by several scholars in the last century, though no conclusive answer has been reached.

Figure 23: *South facing section through the full depth of the peat deposits. Early timber posts can be seen to the left of the image.*

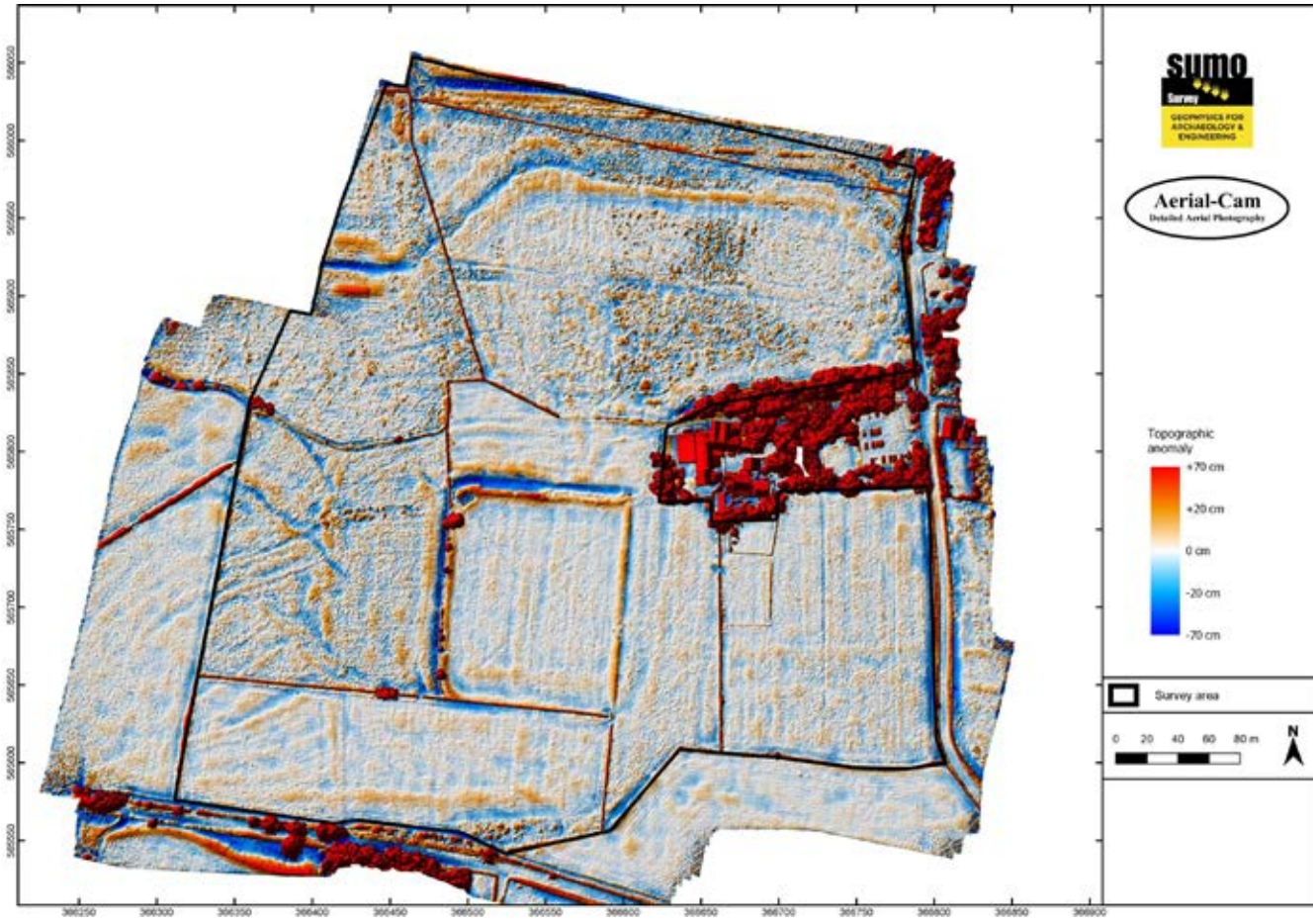

Figure 24: *Topographic map of Magna showing the diversion of the* vallum *to the north of the fort (Austrums and Stanford 2019: 24).*

F.G. Simpson and R.C. Shaw (1922: 358, 361) surmised that the *vallum* diverted to avoid the peat bog to the south, though they acknowledged that this was not a consistent strategy along the length of the ditch and that at least two places were noted where it was dug through peat deposits. This indicates that the Romans could carry the *vallum* across boggy ground, and so the terrain cannot be the sole cause of the Magna diversion. Eric Birley (1949: 64) presented the theory that the *vallum* diverted to avoid the site selected for the construction of a fort, as it does at Benwell and Halton, at the centenary pilgrimage of Hadrian's Wall. However, this hypothesis has been proven unlikely due to the recent identification of an ancient lake in this area (Birley Andrew R. *et al*. 2021: 20). Any hypothetical fort in the area would have been situated in the lake and surrounding peat bog (Fig. 15).

Little physical investigation of the *vallum* at Magna had been carried out prior to the 2024 excavations. Several sections across the centre of the diversion were excavated by Brenda Swinbank in 1951, however these were to investigate potential causeways across the ditch rather than the diversion itself (Swinbank 1953: 91). The section of *vallum* excavated as part of the Magna project (see Chapter 2.2.3) did not shed any light on the reason for the diversion; however, the discovery of an earlier Roman ditch to the south (see Chapter 2.3.4) provides a potential explanation. This E-W ditch occupies the projected line of the *vallum* if no alteration to its course had been made. A recut dating to the early 2nd century indicates that it was likely still in use at the time of the *vallum's* construction, although its purpose at this time is uncertain due to the small area excavated. The presence of an extant military ditch still in use by the inhabitants of Magna fort would seem to be an obvious reason to alter the course of the *vallum*, with the additional benefit of avoiding an area of boggy ground.

2.6.2 A FRONTIER CEMETERY

The discovery of 11 cremation burials and associated funerary features in the hinterland of the *vallum* has been one of the major revelations regarding the use of this landscape in the Roman period. These follow on from and provide further context for the cist grave excavated during the 2023 season outside milecastle 46 (Frame *et al*. 2024: 6), meaning it was

no longer an isolated burial but part of an ongoing funerary tradition within the frontier landscape.

The presence of burials on Hadrian's Wall is not without parallel, but it is by no means a common occurrence. Most instances comprise isolated burials, such as those found at milecastles 9 and 35 (Crow and Jackson 1997: 65), while cemeteries are generally directly related to a fort such as at Birdoswald or Carlisle (Wilmott 1993; Hobson 2024).

The seven cremations at the south end of the trench, buried in association with an earlier military ditch, can be more directly compared to burials at other northern military sites such as Vindolanda, where cremations were placed into the fills of earlier fort ditches (Birley Andrew R. 2016: 12). By contrast, the internment of cremated remains within the earthworks of the *vallum* is currently unique along the length of the frontier. The closest comparison for these comes from the Cumbrian coast, where a small group of cremations were found to the north of mile fortlet 4 (Bellhouse 1954: 55).

When considering the style and date range of the burials (see Chapters 2.2.2, 2.3.3 and 5 for more detail), further comparisons can be drawn with frontier fort sites such as Birdoswald. Most of the cremation deposits recovered from the cemetery at Birdoswald during the 2009 excavation are listed as 'uncontained', however a single wooden box burial is noted within the assemblage (T. Wilmott, *pers. comm*.). These provide excellent comparisons for Magna: the single box burial is a close parallel, while the uncontained remains reflect the simplicity of the burials at Magna. Previous excavations in the Birdoswald cemetery produced ceramics with dates spanning from the Hadrianic-Antonine period through to the 3rd-4th centuries (Wilmott 1993: 80-82; Cool *et al*. 2009: 279-281), again mirroring the date range for the cemetery at Magna (see Chapters 5 and 11.3.2). This suggests that despite the unusual location of the cemetery at Magna, it does fit within a wider tradition of burials on the northern frontier, both in the style of the burials and the period of use.

In addition to the burials themselves, evidence of the full funereal process, ranging from initial burning on the pyre to burial and finally disposal of excess pyre material, was uncovered. This has provided further insight into not just the burial practices but the associated cremation rites. The remains of the pyre consisted of a large oblong block of ash located in a shallow cut adjacent to the southern cremation group. Several layers of burnt deposits were visible within the block, along with pockets of pyre debris in its immediate vicinity, indicating that this was likely an *ustrinum*, or designated pyre site which was reused on multiple occasions, as defined by Polfer (2000: 31-32).

While the individual cremation burials contained no deliberately deposited grave goods, a concentration of ceramic sherds recovered from the pyre and associated contexts (see Chapters 11.3 and 11.4 for analysis) indicates that material culture was not completely absent from the funerary rites. The burning of grave goods, including animals and pottery vessels, on the pyre with the deceased is known to have been part of the cremation process in the Roman period (Toynbee 1996: 50). Part of this material may then be collected with the burnt bone and included in the burial, as seen at Magna with occasional sherds recovered from the burials.

Located adjacent to the northern cluster of burials, a larger pit containing pyre debris from multiple cremations represented the end of the funerary process. The roughly stratified and mixed nature of the material within it suggests that it was infilled over a period of time (Fig. 25), and it is likely that this occurred after the regular cleaning of the pyre site (Polfer 2000: 32; McKinley 2000: 39). Large pits that were used to deposit the material collected during the cleaning of the *ustrina* are known from sites including Velzeke in Belgium and York in the UK, though in general very few have been recorded due to the difficulty in differentiating them from other features such as mass graves (Polfer 2000: 32). This evidence for repeated cleaning of the site demonstrates the longevity and continuation of the ritual use of the landscape.

Figure 25: *West facing section of the pyre debris pit (after sampling) showing the rough stratification and concentration of different burnt materials within the fill.*

Due to the narrow area excavated as part of this project, it is impossible to ascertain the full scope or layout of the cemetery at present. It seems likely that further burials exist beyond the current limit of excavation; the southern cremation burials were concentrated to the west of the pyre (at the edge of the trench) and the potential boundary ditch for the northern cluster continues to the east, suggesting the cemetery is likely to continue as well. The potential for additional pyres, particularly associated with the cremations to the north, also cannot be ruled out.

Although the burials clearly form part of a deliberate funerary landscape, it appears isolated from the main cemetery for the fort and civilian settlement of Magna. This is expected to lie to the east and southeast of the fort platform, as attested by the discovery of at least three tombstones from this part of the site (RIB 1832, 1834 and 3398; several other funerary inscriptions are recorded from the site but lack more detailed findspots). This location is supported by the results of geophysical survey carried out in 1999 which shows a series of rectangular anomalies, interpreted as potential graves, arranged in rows in the field to the east of the fort (Biggins and Robinson 2000: 9, Figure 20).

The reason for this separation of the dead is currently unclear but it is evident that those individuals buried on the frontier did not form part of the main community living at Magna. It may be that they were part of a more transient population, people who were only in the area for a short period of time or who were simply passing through but did not survive to reach their final destinations. Ongoing analysis of the remains will aim to shed further light on who the individuals buried in this cemetery were and where they had come from (see Chapter 5).

2.6.3 LAKESIDE ACTIVITY

The area to the north of Magna fort, now covered by a peat bog, was historically on the shore of an ancient lake as previously identified through bore hole analysis (Birley Andrew R. *et al*. 2021: 20). Roman occupation in this part of the site was speculated to be centred on the location of the well and its potential ritual deposition. A more nuanced understanding of the well and its relationship to the adjacent lake was a key research aim for the project (Birley Andrew R. 2022: 20). Although the well was found to be post-medieval in date, stratigraphically secure deposits dating to the Roman period were recovered from the surrounding bog (see Chapters 2.5.1 and 2.5.3).

Evidence for human intervention or activity within these deposits was relatively limited and primarily consisted of the deposition of silver birch bark (Fig. 26) and manure, likely from horses (Fig. 22). Deposits of this nature were not recorded elsewhere within the excavations that took place in the bog, perhaps suggesting that this was a deliberate activity that was targeted in this area rather than an unintentional buildup of material across the wider landscape. The occurrence of these materials in close association is of note as both can be used in the leather production process; the dung to loosen the hair for removal and the bark as a source of tannins to tan the raw hides (Higham 2006: 84; Grömer *et al*. 2017: 72).

Tanning was a lengthy and resource intensive industry during the Roman period, taking up to two years to tan, large or thick hides (van Driel-Murray 2011: 74). Investment in dedicated infrastructure to support the processing of skins at multiple different stages to ensure a steady supply of the finished product was necessary to make the production of leather a viable business. Despite this, the evidence for leather tanneries in the Roman Empire is surprisingly scarce, with the only confirmed example found at Pompeii. Furthermore, no tannery sites have been identified in Britain to date, despite the large number of leather goods recovered from sites with the appropriate preservation conditions (Keily and Mould 2017: 241). Their presence within the province can be assumed due to the large number of hides that would have been produced as a byproduct of feeding the army and the impracticality of shipping those hides to tanneries in the central regions of the empire (van Driel-Murray 2011: 75; Douglas 2015: 37).

The lack of identified tannery sites may therefore be due to a few factors. Much of the infrastructure needed for leather production is rather ambiguous when seen in isolation in the archaeological record. Pits, tanks and water supply systems can all be attributed to multiple industries if no associated material culture is present to support the identification of a tannery (van Driel-Murray 2011: 71, 79). Another hindrance in the identification of tanning operations is the potential for dispersed production resulting in less distinctive structures and waste deposits, particularly in the northern provinces where vegetable tanning was a newly introduced industry. It may well be that the early stages of hide preparation were conducted separately from the tanning to maximise the extraction of other resources such as hair and sinew for use in other industries (van Driel-Murray 2016: 137).

Figure 26: *A sheet of silver birch bark preserved within the peat bog surrounding the post-medieval well.*

At first glance, the evidence from the bog may seem to point towards a tannery at Magna: the dung being used to dehair hides, the bark acting as a source of tannins and the adjacent lake providing the necessary water supply for the process. However, limited structural remains were uncovered to accompany the raw materials, with no evidence of the large pits and vats needed for the prolonged soaking of the hides (van Driel-Murray 2011: 75 Table 1). The only evidence for potential buildings came in the form of a section of laminated floor and two adjacent timber posts (see Chapter 2.5.3). These posts could be interpreted as a frame for stretching hides to dry, as seen with the numerous paired post-holes at Hofheim (van Driel-Murray 2011: 74), while the flooring could have formed part of an associated working platform. The lack of further structural evidence may be due to the limited area available for excavation or, if the structures were originally timber, the changing preservation conditions associated with the desiccation of the bog (see Chapter 2.5).

Overall, the deposits excavated within the peat bog immediately north of the fort are indicative of at least low-level activity in this space during the Roman occupation of the site. Although lacking the conclusive structural evidence needed to identify the site as a tannery, the presence of raw materials used in trades such as tanning leather makes it likely that some form of industrial processing was happening on the site. These processes potentially took advantage of the nearby water supply, or its advantageous location separated from the main settlement.

3. SMALL FINDS

A total of 56 small finds were recorded during the 2024 excavation, including those categorised under the separate headings of human remains, leather and wood. Material included in the general small finds category includes glass beads, *lorica squamata* scales, a ceramic gaming counter and a lead weight, along with a range of other metal artefacts. The full catalogue can be found in Appendix 2, while specialist reports on the coinage, leather and human remains are provided in the following sections. Information on wood identification from select small finds can be found in Appendix 9.

3.1 COINAGE – DR FAE AMIRO

The only coin from Magna to date is a radiate copy found inside the milecastle in 2023 (Fig. 1). The obverse portrait is young and beardless, with Tetricus II as the closest match. The reverse type shows a standing figure with several anatomically incorrect features, most notably the arms. Neither inscription can be linked with that of a specific type. The coin's manufacture has a *terminus post quem* of 273, and it was likely produced within a decade of that year.

Figure 1: *The coin found during the 2023 excavations at milecastle 46 (L: obverse, R: reverse).*

4. THE LEATHER OBJECTS FROM THE 2023 AND 2024 EXCAVATIONS

DR ELIZABETH M. GREENE

4.1 INTRODUCTION

The leather that has emerged so far from the excavations at Magna has been minimal but confirms the positive conditions for the preservation of leather at the site and indicates that Magna will likely produce further leather discoveries in the future. The very small amount of leather from the 2023 excavation, three objects in total, is not at all surprising; the work in 2023 concentrated on a high point in the field to the north of the fort directly next to Hadrian's Wall and focused primarily on the upper stratigraphic levels revealing the milecastle that sat just beneath the turf (Frame *et al*. 2024). It is surprising that any leather was found at all, and these objects came from a few small pockets of waterlogged/anaerobic deposits.

The 2024 excavation produced slightly more leather, with fourteen objects recorded in total. The conditions were good for leather preservation, especially the fill of an early Roman ditch within the excavation area (see Chapter 2.3.4). The objects themselves are not unusual, and the assemblage looks very much like the leather from Vindolanda, seven miles to the east of Magna (van Driel-Murray 1993; Greene and Birley B. 2020). The most complete objects are several shoes in various states of preservation and the rest are unidentifiable fragments of leather that could have been part of tent panels, garments, or equipment.

4.2 DISCUSSION

The level of discussion is limited by the fragmentary nature of most objects, but there are a few noteworthy comments about the Magna leather assemblage so far. Even though two of the three objects found in 2023 were from shoes, they were too fragmentary to provide any further details about style, construction, or ownership. Turning to the 2024 finds we can say a bit more about the group of objects. Seven of the shoes were preserved well enough to determine the probable owner in antiquity. Three of these belonged to children (Cat. Nos. 4, 5, 7) and four were clearly in the size range of an adult male (Cat. Nos. 9, 12, 13, 14).

Figure 1: *The best-preserved child's shoe from the 2024 excavations. ML-2024-2, Cat. No. 5.*

The children's shoes were all found in the same context (M24-133) together with most of the leather objects recovered in 2024 (Fig. 1). The context is the secondary fill of a large ditch dating to the pre-Hadrianic period on site, before the 120s CE. The presence of children's shoes is not at all surprising in this context, even at this early phase of occupation before the relative stability after Wall construction. Geophysical surveys completed at Magna (Biggins and Robinson 2000) indicate that there was a robust extramural settlement associated with the fort, spread out around the south and west sides of the fort. Families of all sorts, whether associated with the soldiers stationed at Magna or not, surely comprised a significant portion of the population of the extramural settlement (Allason-Jones 1999). The ditch where these shoes were found naturally became a rubbish tip, probably for those living in both the fort and the settlement outside its walls. Families may also have lived inside the fort walls, for instance in the *praetorium* (commanding officer's residence) or the barracks (van Driel-Murray 1998; Greene 2013, 2014), or they may have worked inside the fort during the day (Allison 2006, 2013). The general habitation of women and children in and around the fort results in the loss and discard of objects associated with these individuals throughout the areas of the settlement.

Four of the shoes were clearly owned by adult males and some were quite large indeed (Fig. 2). These came from three different contexts (M24-133, M24-141, M24-189). These contexts all represent primary and secondary fills from ditches (a pre-Hadrianic ditch and the *vallum*), which suggests they are part of a discard pattern on site, probably intentionally tossed aside into the rubbish of the ditches. The men's shoes may represent the soldiers at Magna but could also have belonged to anyone living in the settlement, such as merchants, tradesmen, or craftsmen. When only the sole of a shoe is preserved without its uppers it is usually impossible to determine the style of the shoe, a visual detail that might connect it to a particular owner (van Driel-Murray 1999). Some scholars have found it tempting to connect the discovery of hobnails to the presence of Roman soldiers, but this is somewhat erroneous, even if tempting. Most shoes from the Roman period in northwest Europe have hobnails and they are not reserved only for soldiers' boots; hobnailed footwear is found in all sizes, many styles, and of varying quality, and only a few specific styles were intentionally smooth on the outer sole (*carbatinae*, cork slippers and some sandal styles are the most common; van Driel-Murray 2007). Therefore, the presence of hobnailed shoes does not immediately suggest they were

Figure 2: *A large shoe worn by an adult male. ML-2024-9, Cat. No. 13.*

owned by a soldier, even if that is a very likely probability at a military fort.

It is still too early and the finds too few to say anything about the percentages of shoe sizes represented, but these early indications suggest that the assemblage at Magna could eventually look very much like that at Vindolanda, where a range of shoe styles belonged to men, women, and children (van Driel-Murray 1993; Greene 2014). There is already clear representation of children in this environment and even if no shoes yet fit into the range of female ownership, the evidence for children naturally suggests the presence of women.

The other leather objects are too fragmentary for proper analysis (Fig. 3), but they provide a salient reminder of the ubiquity of leather use in antiquity and especially by the Roman army (van Driel-Murray 1985). We should expect to find at Magna a similar range of objects as Vindolanda has produced, which includes shoes of all sorts, tent panels, horse equipment, bags and satchels, straps and toggles, manufacturing offcuts, and many fragments of unclear use. The presence of leather also provides a striking reminder of what we are missing from typical archaeological environments. Without leather, wood, and bone artefacts our analyses only consider a small portion of what was actually used on a daily basis (Greene and Birley B. 2024). At least some of the scrap leather in the Magna assemblage probably came from tent panels and certainly a few pieces are reinforcement straps that held the panels of a tent together. It is always possible that fragmentary sheet leather was originally part of a garment of some sort, but we do not have any complete garments made from leather in the Vindolanda assemblage, suggesting this is a rare find. As always, some of the fragments of leather will remain unidentified because of their poor condition.

4.3 2023-24 LEATHER CATALOGUE

Each object found during the 2023 and 2024 excavation seasons is described below, accompanied by its description, measurements, archaeological context, and information about the shoe style, construction, and ownership.

Figure 3: *Scrap leather found together including fragments from a tent and a possible patch. ML-2024-12-b, Cat. No. 17.*

All size measurements 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 are labelled on the image in Fig. 4.

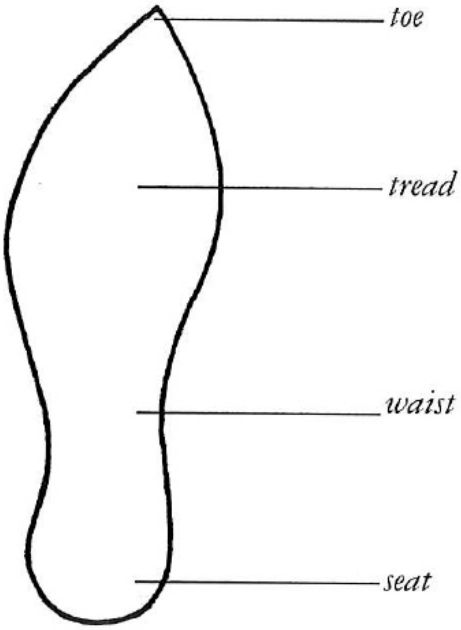

Figure 4: Terminology used for parts of a shoe sole. Image from van Driel-Murray 2007.

1. ML-2023-1-a

Artefact type: Fragments from a shoe sole

Measurements: varied; Weight: 12

Context: M23-091 (primary fill of a well inside the milecastle)

Description: 7 fragments of shoe leather from the sole layers. They all have holes from the hobnails, which are now missing. All fragments are torn on most edges and have no discernible features for further description. The largest fragment certainly came from a large shoe, presumably worn by an adult male. All other fragments are too small for further discussion.

2. ML-2023-1-b

Artefact type: Scrap leather

Measurements: varied; Weight: 5

Context: M23-091 (primary fill of a well inside the milecastle)

Description: 2 fragments of thin leather. The larger scrap has 3 torn/cut edges, and the fourth edge is straight and finished with small stitch holes that are in a rough line but somewhat randomly spaced. There is a hole in the centre of the larger fragment. The small fragment is folded over and is mostly torn on the edges, but one small edge is cut straight with a line of stitching. Original object unknown.

3. ML-2023-2

Artefact type: Fragments from a shoe sole

Measurements: varied; Weight: 1

Context: M23-088 (secondary fill of a well inside the milecastle)

Description: 2 very small fragments of shoe sole layers. They have holes from the hobnails, now missing, and all edges are torn. There are no discernible details to say anything about size or style of the shoe.

4. ML-2024-1

Artefact type: Fragments from a shoe

Measurements (outer sole fragment): Length: 131.9; Tread width: 71.5; Waist width: 51.4; Seat width: 54; Depth: 2; Weight: 13

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: 3 parts of a shoe are preserved including the heel stiffener, a fragment of the outer sole, and a small bit of the upper. The fragment of the sole is a delaminated outer sole layer, preserved in the seat and waist only, and torn just before the widest part of the tread. The hobnail holes are intact showing a simple organization of outer edge line, 4 hobnails at the seat in a diamond shape, and a single line up the middle toward the tread. This shoe probably once had a decorative hobnail pattern under the tread. The heel stiffener is rather small and narrow, suggesting it may have belonged to a child (ca. 43mm at the widest part of the seat). The fragment of upper appears to have belonged to the back of the shoe around the heel stiffener. No details about the shoe style can be determined.

Shoe construction type: nailed

Shoe style: unknown

Sole shape: tapering

Toe shape: unknown

Stud pattern: uncertain but probably decorative

Foot side: unknown

Size and probable owner: small, child

5. ML-2024-2

Artefact type: Shoe insole, complete, with detached shoe fragments

Measurements (insole): Length: 181.7; Tread width: 66.5; Waist width: 41; Seat width: 40

Depth: 4.5; Weight: 32

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: The insole of a shoe is preserved complete, with midsole layers and thong attached to the underside. The sole is small and probably belonged to a child. The thong construction is visible on the upper side of the insole. 6 fragments of midsole layers are associated. The most substantial is a midsole layer from the toe area. All other fragments are torn on all edges, and all have holes from hobnails that are now missing. 4 scraps of uppers are preserved with lace holes preserved in 2 of them. One of the associated scraps may not belong to this shoe.

Shoe construction type: nailed and thonged

Shoe style: unknown

Sole shape: tapering

Toe shape: oval

Stud pattern: unknown

Thong pattern: Diamond with extra thong at waist

Foot side: right

Size and probable owner: small, child

6. ML-2024-3

Artefact type: Fragments of sheet leather

Measurements (largest fragment): Length: 420; Width: 215; Depth: 1; Weight: 20g

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: 3 leather scraps of varying sizes. The largest fragment has torn edges and the surface is abraded. There are several slits cut through the leather that appear to have been made with a sharp edge, but they are random as if from manufacturing or workshop activities. One small corner is squared, though this is probably fortuitous, and there is a hole near the corner that may have once held something securing the leather. The other two fragments are smaller and have torn edges with no further details apparent to discern the size or use of the original object.

7. ML-2024-4

Artefact type: Incomplete shoe, including insole and other shoe fragments

Measurements (insole): Length: 91.5 (orig. 120-130); Tread width: 45.7 (inc); Waist width: 30.6; Seat width: 31.6; Depth: 2.5; Weight: 8

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: Several fragments from a small shoe. The largest piece is from the insole and preserves the seat, waist, and part of the tread of the shoe. The shoe is missing the toes and would originally have been only 120-130mm in total length. Two sections of thong are visible in the insole surface at the seat and waist. The underside of the insole preserves fragments of the midsole attached. 3 further fragments of midsole layers are detached, one from the seat and waist. 4 fragments of upper are preserved, detached. Two have parts of a rounded lace hole, and one with the lace hole also has a stitched seam preserved. Not enough of the uppers are preserved to discern the style of the shoe, though it does appear to have been a closed leather upper, rather than one with open-work details.

Shoe construction type: nailed and thonged

Shoe style: unknown

Sole shape: swayed

Toe shape: unknown

Stud pattern: unknown

Thong pattern: unknown

Foot side: right

Size and probable owner: small, child

8. ML-2024-5

Artefact type: Incomplete shoe uppers

Measurements (laying flat): Length: 273; Width: 86; Depth: 2; Weight: 6

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: These are the uppers from a low shoe preserving the section from the back of the heel and around the ankles. The rounded, protruding lace hole is preserved completely but with a small tear, on the left side of the foot. The start of the lace hole is preserved but is torn on the right side. The upper edge around the ankle is hemmed and finished with a line of tight stitching. The very back centre of the heel rises up to a peak, where the leather is torn, probably where a decorative pull tab once sat. Under the lace holes are two decorative cut-out triangles. Otherwise, the leather preserved is a closed shoe upper.

9. ML-2024-6

Artefact type: Incomplete shoe sole

Measurements (insole): Length: 133 (orig. ca. 230-250); Tread width: 85.2; Depth: 8.6; Weight: 36

Context: M24-141 (primary fill of a large pre-Hadrianic military ditch)

Description: The insole and outer sole from a large shoe are preserved in the toe and tread area only. They are torn and abraded on the lower edge toward the waist. It is difficult to estimate the original size, but the shoe was quite large, certainly worn by an adult male. 3 hobnails are intact in the outer sole in the toe area and 3 worn nails are detached. 8 fragments of midsole layer are detached, all torn and offering no help in identification. All fragments have holes from hobnails.

Shoe construction type: nailed and thonged

Shoe style: unknown

Sole shape: unknown

Toe shape: oval

Stud pattern: linear

Thong pattern: unknown

Foot side: right

Size and probable owner: large, adult male

10. ML-2024-7-a

Artefact type: Fragments from a shoe

Measurements: varied; Weight: 13

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: 4 fragments of a shoe. One small fragment is from a sole layer with holes from the hobnails that are now missing. 2 small scraps are from the upper, one at the vamp seam and the other preserves the decorative upper edge of a shoe with some rouletted surface decoration. The largest piece is a detached heel stiffener.

11. ML-2024-7-b

Artefact type: Fragments of sheet leather

Measurements: varied; Weight: 44

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: 11 fragments of thin sheet leather. One large fragment is torn on all edges and through the centre. There are no discernible features to identify the object further, but it is likely to have been part of a tent panel. 10 smaller fragments are all thin leather with torn edges and abraded on the surface. A few fragments have a small bit of stitching. None seem to be manufacturing offcuts.

12. ML-2024-8

Artefact type: Fragments from a shoe

Measurements (insole): Length: 170 (orig. Ca. 230-250); Waist width: 52.3; Seat width: 54.6; Depth: 1.5; Weight: 42

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: Very poorly preserved shoe. The largest piece is from the insole, remaining only in the seat and waist, and broken near the tread area. The edges are missing just above the waist and only the centre portion remains in the tread. There are many holes from hobnails, now missing, and a single thong is visible at the seat. 6 further fragments of sole layers are preserved mostly from the midsole and perhaps one fragment from the outer sole (no measurements possible). The heel stiffener is complete and detached from the sole layers and one fragment of the upper from around the stiffener is detached.

Shoe construction type: nailed and thonged

Shoe style: unknown

Sole shape: swayed

Toe shape: unknown

Stud pattern: decorative

Thong pattern: unknown

Foot side: unknown

Size and probable owner: large, adult male

13. ML-2024-9

Artefact type: Almost complete shoe

Measurements (insole): Length: 248.3; Tread width: 94.3; Waist width: 58.2; Seat width: 57.5

Measurements (outer sole): Length: 270; Tread width: 103; Waist width: 66.8; Seat width: 55.3

Depth: 23.7; Weight: 79

Context: M24-141 (primary fill of a large pre-Hadrianic military ditch)

Description: Well preserved large shoe with complete insole, midsole layers, and a delaminated outer sole. 4 fragments of sole layers are detached, probably from midsoles. One large piece of upper from one side of the shoe is detached and shows this is a low shoe sitting below the ankle. The upper is undecorated but preserves the lower half of the lace holes, which are torn at the top. The heel stiffener is complete but detached from the sole unit.

Shoe construction type: nailed and thonged

Shoe style: low shoe

Sole shape: tapering

Toe shape: oval

Stud pattern: linear

Thong pattern: length

Foot side: right

Size and probable owner: large, adult male

14. ML-2024-10

Artefact type: Incomplete shoe

Measurements (insole): Length: 149.8 (orig. 210-230); Tread width: 79

Measurements (outer sole): Length: 234.7 (orig. 240-250); Tread width: 92.7; Depth: 30.5; Weight: 47

Context: M24-189 (lower backfill of the *vallum* ditch)

Description: Poorly preserved shoe with only parts of each sole layer remaining. The shoe is missing most of the seat. The insole is preserved only in the toe and tread area and is torn before the waist. The edges are curled up and torn on both sides of the tread, and a large tear below the tread runs inward from the medial side. A greater portion of the outer sole remains, preserved complete in the toe and tread but is fragmentary and incomplete in the waist and seat. A few small fragments of shoe, possibly uppers, are detached.

Shoe construction type: nailed and thonged

Shoe style: unknown

Sole shape: tapering

Toe shape: oval

Stud pattern: linear

Thong pattern: diamond

Foot side: right

Size and probable owner: large, adult male

15. ML-2024-11

Artefact type: Scrap leather

Measurements: varied; Weight: 14

Context: M24-133 (secondary fill of a large pre-Hadrianic military ditch)

Description: 3 medium sized fragments of thin sheet leather. 2 fragments have a straight edge with stitching. The larger of the two has a straight edge hemmed and stitched. All other edges are torn, and surfaces are torn and abraded. This probably came from a tent panel but there is no possibility to reconstruct the object.

16. ML-2024-12-a

Artefact type: Fragments from shoe uppers

Measurements: varied; Weight: 7

Context: M24-141 (primary fill of a large pre-Hadrianic military ditch)

Description: 3 fragments from the uppers of a shoe. All fragments have a sewn edge, which may be from a vamp seam or similar. One fragment has a broken lace hole. The leather is closed and does not have openwork decoration. Nothing more can be discerned about the shoe style, size, or construction details.

17.ML-2024-12-b

Artefact type: Scrap leather

Measurements: varied; Weight: 24

Context: M24-141 (primary fill of a large pre-Hadrianic military ditch)

Description: 12 fragments of leather. 1 fragment was cut from thick leather and is a manufacturing offcut. 11 fragments are thin sheet leather with torn and cut edges. They were probably part of a tent panel originally. One fragment is oval and may have been a patch (but there are no stitch lines) and another fragment is a strip with two stitch lines down the long edges, probably a reinforcement strap from a tent.

5. A CREMATION CEMETERY ON HADRIAN'S WALL

DR TRUDI BUCK, DR JANET MONTGOMERY & DR JOANNA MOORE

5.1 INTRODUCTION

This report presents the interim results of the analysis and interpretation of a cremation cemetery located between milecastle 46 on Hadrian's Wall and the Roman fort of Magna, excavated during the summer of 2024. Cremation cemeteries have been identified at several forts on or near the northern frontier of Roman Britain, including Birdoswald (Wilmott 1993; Wilmott *et al*. 2009), Low Borrowbridge (Hair and Howard-Davis 1996), and Carlisle (Hobson 2024). A series of eleven cremation burials, a probable pyre site and a large pit of redeposited pyre material were located across the excavation area. The most interesting aspect of this cemetery is that all burials excavated so far lacked cinerary urns, accessory vessels and surviving grave goods. This contrasts with all other cemeteries associated with northern Roman military sites. At these locations, including Birdoswald (Wilmott 1993; Wilmott *et al*. 2009), Beckfoot (Howard-Davis *et al*. 2017) and Brougham (Cool 2004), un-urned cremations are present but often outnumbered by cremation burials within ceramic urns and often with associated vessels. It must be noted, of course, that it is unlikely that the full extent of this cemetery has been revealed through the excavation and future research may alter the picture that we have at this time.

Analysis of archaeological cremation burials can be complex and interdisciplinary in nature, but they are essential for informing on the funerary rites of a local community and for providing biological and social information about past populations. It is known that human skeletal remains can provide not only biological data about the deceased individual, data such as their sex, age-at-death and stature, but also information pertaining to migration, health and diet (Gowland 2017). Although the burning of the body creates very specific changes to the human skeleton, current methodologies allow for the analysis of complex cremation contexts and a better understanding of how the dead were treated in the past (Thompson 2025). Whilst it is often the richly furnished burials that are emphasised as providing data about the people of Roman cemeteries (Hobson 2024), cremation burials are rich sources of information when both the osteological and archaeological contextual data are taken together. A cremation burial is only the final part of a series of events following the death of an individual, rites which are undertaken by friends, family and peers of the deceased and which may have been more important to them than the final deposition of the bodily remains. The process of a cremation pertains to activities that occur before, during and after the burning of the body and has more logistical steps to it than an inhumation burial (Thompson 2025). What is revealed by archaeological excavation is only a small part of the full ritual which would have started with the preparation of the corpse and the building of the pyre and finished with the burial of some or all of the burnt remains.

5.2 ARCHAEOLOGICAL BACKGROUND

In 2023, a 4th century inhumation burial was excavated alongside the northeastern edge of milecastle 46 (Frame *et al*. 2024). No other burials were located during that season of excavation. It is known, however, that cremation burial remained the main funerary rite in the north of Britain at least into the 3rd century CE (Philpott 2016). In 2024, a series of small pits containing discrete deposits of burnt ash and bone were located between the area south of milecastle 46 and the northern ditches of the auxiliary fort of Magna. The first pits containing burnt bone, ash and burnt soil were located to the north of the *vallum* (see Chapter 2.2.2). Following excavation, the pits were interpreted as cremation burials due to the inclusion of fully calcined bone within them. A further series of burials were located south of both the *vallum* and the pre-Hadrianic ditch (see Chapters 2.3.2 and 2.3.3) located towards the southern-most section of the excavated area (Fig.1).

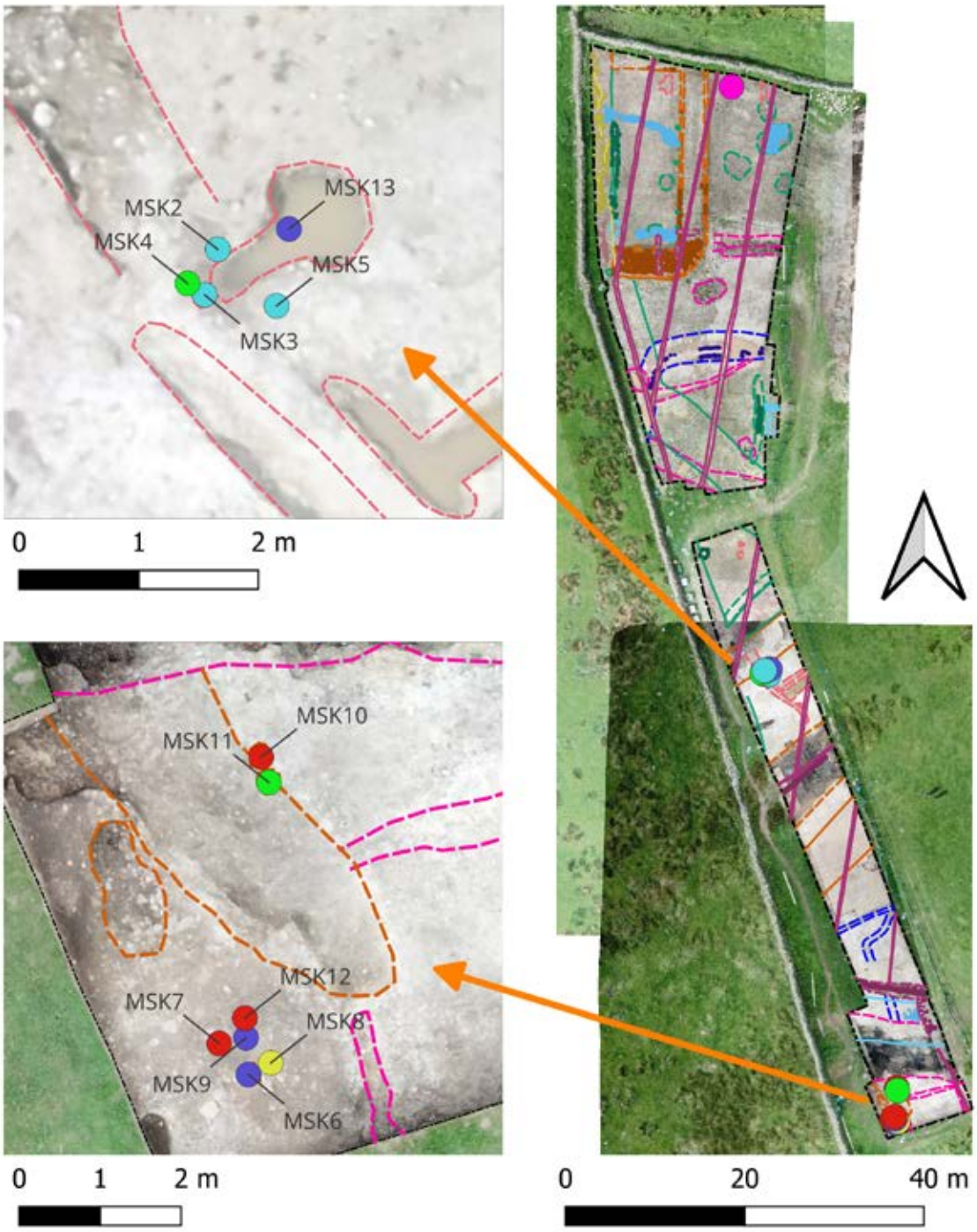

Figure 1: *Plan of the excavation area showing the location of two clusters of cremation burials north and south of the* vallum.

Overall, eleven small pits were classified as cremation burials. Most of the pits were shallow and subcircular in shape, with U-shaped profiles cut into the natural subsoil. The burials did not contain any cinerary urns or grave goods and were cut directly into the subsoil, with the burnt bone, ash and other pyre material contained within a tight bundle made of organic material such as cloth which did not survive. The concentration of material in the cremation bundles had a distinctive black and dark-red colouration and consisted of a mixture of burnt bone, both human and in some cases animal, and carbonised remains of wood, charcoal and ash from the pyre. The exception to this was the earliest dated burial which had a rectangular grave cut and probably represented a burial contained within a wooden box, though this also did not survive archaeologically. All burials contained a relatively large volume of carbonised material from the funeral pyre and some also had burnt animal bone within the contents, though species and element identification were not possible for most of the bone. Only two of the burials contained sherds of pottery, both one fragment of black-burnished ware, and one burial contained a single hobnail from a shoe. This latter may suggest that the individual was wearing shoes

when cremated, or possibly buried with shoes alongside the body, as found in some Roman inhumation graves (Pollard 2011). This was the only evidence of clothing discovered in the burials, which may suggest that the bodies were naked or shrouded when burnt. All the burials contained only a small amount of burnt bone, representing a mere fraction of what would be expected from a cremated adult body (McKinley 1993).

5.3 BURIALS NORTH OF THE *VALLUM*

5.3.1 CREMATION BURIAL M24-99

A burial on the west edge of a larger pit of burnt remains (see Chapter 5.3.3), situated in a group with M24-103 and M24-105. The burial pit was shallow, measuring 0.18m x 0.16m across and 0.19m deep. The pit was filled with very dark and loose material consisting of burnt bone and ash (Fig. 2). Approximately 228g of burnt bone was recovered. The deposit formed a sub-circular cut and was likely originally placed within an organic container of leather or cloth, forming a discrete bundle rather than a diffuse spread. The bone ranged in colour from yellow/white to brown, with some bone white and fully calcined (see Fig. 3). This suggests that parts of the body had been burnt at different temperatures, presumably depending on where on the pyre they had been positioned. This situation is the same for most of the burials discussed below. The bone fragments ranged in size from less than 1cm to approximately 8cm in length. The only identifiable human bone was a fragmented hallux distal phalanx. The radiocarbon date for this burial was cal. 275 – 347 CE and no isotope data was retrieved.

Figure 2: *Cremation burial M24-99, below the scale, cut into side of redeposited pyre debris pit M24-83.*

Figure 3: *The burnt bone from cremation burial M24-99.*

5.3.2 CREMATION BURIALS M24-103, M24-105 AND M24-117

Three burials were closely clustered together along the western edge of the pyre deposit pit (see Chapter 5.3.3). All three were shallow pits filled with dark black and red material consisting of burnt bone and ash. Each deposit formed a sub-circular cut and was likely originally placed within an organic container of leather or cloth, forming a discrete bundle rather than a diffuse spread.

M24-103

The burial pit measured 0.15m x 0.13m across and 0.12m deep. Approximately 51g of burnt bone was recovered. The burnt bone was yellowish to brown in colour. The bone fragments ranged in size from less than 1cm to approximately 4cm in length. The radiocarbon date for this burial was cal. 224 – 376 CE and the strontium isotope results showed this individual to be non-local in origin. A sherd of a black-burnished ware 1 jar was found in the burial.

M24-117

The burial pit measured 0.22m x 0.18m across and 0.12m deep. Approximately 22g of burnt bone was recovered. The burnt bone was mainly white/white-grey in colour indicating a high burning temperature (Ellingham *et al*. 2015). The bone fragments ranged between less than 1cm to approximately 3cm in length. No date or isotope data was retrieved from this burial. A sherd of a black-burnished ware 1 jar was found in the burial.

M24-105

The burial pit measured 0.22m x 0.18m across and 0.12m deep. Approximately 22g of burnt bone was recovered. As with M24-117, the burnt bone was mainly white/white-grey in colour indicating a high burning temperature (Ellingham *et al*. 2015), though the bone fragments here ranged from about 1-4cm in length. The radiocarbon date for this burial was cal. 271 – 351 CE and the strontium isotope results showed this individual to be non-local in origin.

5.3.3 PYRE DEPOSIT PIT M24-84

This feature is unlikely to represent a single cremation burial as it is a large pit measuring 1.5m in length and 0.94m wide, with a depth of approximately 0.29m and its fill was made up of separate layers presumably from deposition at different times. It is interpreted as a pit used to bury remaining debris from the pyre after the collection of any burnt bone for separate burial following the funerary cremation. The pyre debris formed a mound above the surrounding ground level, creating a large spread of pyre debris (M24-96) as the pit was overfilled. This spread of pyre debris contained a rim of a black-burnished ware 1 cooking pot. The pit fill had some stratification of the material indicating the repeated use of the area presumably following multiple cremations. The layers of pyre debris were heterogenous in nature, with some containing more burnt bone, charcoal and carbonised wood than others. Approximately 1844g of burnt bone was recovered, though only a possible distal end of a radius was identifiable as human. The bone fragments varied in size from less than 1cm to approximately 6cm in length. There were a range of colours represented amongst the burnt bone, from white to grey to brown, again reflecting the numerous cremation events from which material was deposited.

The amount of burnt bone recovered is greater than the average weight of bone expected from a modern adult individual (Fig. 4) (McKinley 1993) and therefore is likely to represent more than one individual. The date range and stratification of the redeposited pyre material in the pit suggests that the burnt bone likely comes from multiple individuals, though it is not possible to give a minimum or maximum number of cremations represented. The fill contained a significant amount of probable burnt rosewood throughout, presumably from the pyre fuel. Two sherds of a black-burnished ware 1 jar were found in the redeposited pyre material.

The radiocarbon date achieved for pit was cal. 126 – 253 CE which predates the cremation burials M24-99, 103 and 105. M24-117 does not have a recorded date but the location and clustering with these related burials tentatively suggests it may be of the same date. These burials have therefore been cut into and around the sides of the pit, suggesting that the pit was still in use or had been filled within recent memory at that time. Strontium isotope analysis was taken from one of the calcined bones in the pit, the results indicating that this individual was local to the area in their origin.

Figure 4: *The burnt bone following sieving from the redeposited pyre pit M24-84.*

5.4 BURIALS SOUTH OF THE *VALLUM*

A tight cluster of five burials were excavated from the top of a clay mound (M24-169) in an area south of the *vallum* and located more westerly than the northern cluster. These included the earliest of the graves from those able to be dated. As with the burials north of the *vallum* this cluster of graves, except for M24-149, were found as discrete circular or sub-circular pits, the burnt bone and associated pyre material having been tightly wrapped in a cloth or leather bundle. As with the cluster of burials north of the *vallum* there were no grave markers surviving. The remains of a pyre were also located in this area, while a further two burials were excavated close together towards the east.

5.4.1 CREMATION BURIAL M24-149

Context M24-149 is the earliest dated burial, with a radiocarbon date of cal. 110 – 236 CE and is different to all others excavated in that the burnt bone and ash were placed inside what was probably a wooden box and buried within a square-shaped cut (Fig. 5). The wooden container has not survived. The grave cut measured 0.67m by 0.70m with a depth of 0.38m. Approximately 192g of burnt bone was recovered which was consistently a white-yellow colour indicating a lower temperature for the pyre (Ellingham *et al*. 2015). The bone fragments ranged between less than 1cm to approximately 5cm in length. Strontium isotope analysis showed that the individual in this burial was not local to the area.

5.4.2 CREMATION BURIAL M24-156

The burial pit measured 0.27m x 0.27m across and 0.28m deep. Approximately 22g of burnt bone was recovered. The burnt bone was consistently white/yellow in colour including some which was fully calcined. Although only a small amount of bone was found the fragments measured up to almost 10cm in length. There was no radiocarbon date for this burial. The strontium isotope results showed this individual to be non-local in origin.

5.4.3 CREMATION BURIAL M24-157

The sub-circular burial pit measured 0.24m x 0.13m across and 0.14m deep. Only 19g of burnt bone was recovered from the pit and the contents were

Figure 5: *Cremation burial M24-149 during excavation.*

a mixture of burnt bone, charcoal and ash. The burnt bone was mainly white/yellow in colour. The bone fragments were on average very small with the maximum size no more than 3cm in length. No date or isotope data was retrieved from this burial.

5.4.4 CREMATION BURIAL M24-158

The deposit is a potential cremation burial which measured 0.24m x 0.24m across but was extremely shallow at only 0.03m deep. Only 10g of burnt bone was recovered from the pit and the contents were a mixture of burnt bone, charcoal and ash. The burnt bone was mainly white/yellow in colour. The bone fragments were on average very small with the maximum size no more than 3cm in length. No date or isotope data was retrieved from this deposit. The deposit in this possible burial was not as tightly concentrated as the others, with the burnt bone more loosely spread in the ash debris. The cremations in this area on the clay mound were positioned less than 30cm from each other and M24-158 may represent a pyre deposit or a spread from one of the burials clustered around it, rather than a discrete cremation burial.

5.4.5 CREMATION BURIAL M24-172

The burial pit measured 0.20m x 0.18m across and only 0.08m deep. 29g of burnt bone was recovered from the pit and the contents were a mixture of burnt bone, charcoal and ash. The burnt bone was mainly white/yellow in colour. The bone fragments were on average about 4cm in length, identified as long bone fragments. No date was available from this burial but the tight clustering with M24-149, 156, 157 and 158 on the top of the clay mound M24-169 may allow the interpretation that this burial is from the same period. A single hobnail was recovered from the burial. The strontium isotope results for this individual showed that they were of local origin.

5.4.6 CREMATION BURIAL M24-170

This burial was one of only two burials situated on the east side of the pyre site (see Chapter 5.4.8). The burial pit was cut into the side of the ditch containing the remains of the pyre and measured 0.23m x 0.21m across and only 0.05m deep. Approximately 80g of burnt bone was recovered. The burnt bone was mainly yellow and brown in colour. The bone fragments ranged between less than 1cm to approximately 6cm in length. Fragmented animal bone from small mammals was identified within the burnt bone, including a distal epiphysis of a juvenile animal and a phalange of a small mammal, the former being burnt black whilst the latter was white in colour suggesting differential placing on the pyre during the burning process. No date or isotope data was retrieved from this burial.

5.4.7 CREMATION BURIAL M24-171

The burial pit measured 0.22m x 0.20m across and only 0.04m deep. Approximately 38g of burnt bone was recovered. The burnt bone was mainly white/grey in colour. The bone fragments ranged between less than 1cm to approximately 3cm in length. No date or isotope data was retrieved from this burial.

5.4.8 PYRE SITE

A sub-rectangular trench was cut to the south of the pre-Hadrianic military ditch, cutting the southern side of the ditch (see Chapter 2.3.3). The shallow trench, with a U-shaped profile, was deliberately cut to contain a funeral pyre (Figs. 6 - 8). The trench measured 6.4m in length and 1.6m in width with a depth of about 0.31m, with a significant narrowing towards the southern terminus and truncating the northwest corner of a potential timber building nearby. Within the trench cut there was an oblong shaped deposit of highly compacted charcoal, ash and probable burnt rosewood that sat directly on the base of the trench. The deposit measured 2.54m in length, was approximately 0.2m in depth and varied in width between 0.33 – 0.54m. It was made of uneven layers of ash, charcoal and the probable burnt rosewood, with flecks of burnt bone throughout, but no significant collections of bone fragments. Material from the pyre spread into the surrounding deposits and small pockets of burnt bone and ash not contained within discrete clusters, as those identified as burials, were located around the pyre area. Six sherds of pottery were excavated from within the pyre cut, including black-burnished ware jars, a bowl or dish and two fragments of reduced ware. From within the oblong shaped pyre residue pile a further seventeen sherds of pottery were found, including six fragments of Samian from a dish, a beaker and a bowl. Based on the pottery distribution the pyre was probably in use from the 2nd to mid-4th centuries CE (see Chapter 11.5.1).

Figure 6: *Pyre during excavation.*

Figure 7: *Pyre during excavation.*

5.5 CEMETERY ORGANISATION

The cremation burials were situated in two distinct areas, the first located north of the *vallum* and apparently cut into the pit used for redeposited pyre material. The second cluster of burials was situated close to the excavated pyre site, situated south of both the *vallum* and the pre-Hadrianic ditch. Thus far, evidence for a potential boundary or enclosure ditch has only been found to the south of the northern cluster of burials, though the limits of the excavation likely do not cover the whole of the original cemetery area, which may be much more substantial and include features not yet observed. It may also be that the extant military ditch acted as a boundary for the southern cluster. Given the location of the redeposited pyre material it seems unlikely that this was the pit associated with the excavated pyre located to the south. As these two features were contemporary, individuals would have had to carry the remains of the pyre and the burnt body across both the pre-Hadrianic ditch and the *vallum*. It seems more parsimonious that there was another pyre site located closer to the pit that contributed this material. The relatively small scale of the current excavation means that there were likely to have been other burials, pits and pyre sites that have not yet been located.

Figure 8: *Pyre during excavation showing the layers of compact ash, burnt soil and charcoal.*

Apart from the two clusters of burials, there appeared to be only minimal evidence of formal organisation of this part of the cemetery, in the form of a potential boundary ditch to the south of the northern cremation burials. Unlike other cemeteries from similar contexts, such as Low Borrowbridge and Beckfoot there was no evidence for ditches surrounding the southern burial area. Many burials in the Roman period were marked on the surface in some way to commemorate the deceased or simply to locate the grave. At Petty Knowes, High Rochester in Northumberland, for example, the cremation burials were marked with small mounds built over them (Charlton and Mitcheson 1984). The burials at Magna, however, do not show any evidence of such grave markers, though there is always the possibility that any grave markings were made out of organic material such as wood and therefore have not survived. A mound was noted over the pit containing the redeposited pyre material, but this is more likely due to the overfilling of the pit suggested by the surrounding spread of debris than a memorial. The cutting of the northern cluster of burials into the edges of this pit does suggest that there was knowledge of the pit and continuation of use, but not that the burials were to be kept separate from the pit containing the larger remnants of earlier pyres. Three small distinct pits of pyre material, containing the same black and dark red ash, were found just to the north of these burials, but not classed as burials themselves as they did not contain any burnt bone.

5.6 OSTEOLOGICAL ANALYSIS OF CREMATED BONE

The burnt bone from all burials, the pit, and the pyre was analysed. Only the pits that contained burnt bone were considered as cremation burials, including those that had only a very small amount of bone present. Material from the smaller pit contexts were considered as redeposited pyre debris. There were also scatters of burnt bone not contained within a clear burial found widely around the area of the pyre along with spreads of ash around the pyre site and around the large pit. The analysis of burnt bone from archaeological cremation contexts is complex, with a focus, where possible, on the determination of a biological profile of the deceased individual, along with the reconstruction of the funerary rituals performed (Larentis *et al*. 2025). These are based on features assessed in the cremated remains including their colour, weight (including total weight and weight by individual body region), the size range of bone fragments and any deformation of the bone (Gonçalves and Pires 2015). Colour,

weight and fragmentation size are often used as proxies for the degree and temperature of burning but this should be used with caution in analysis as they cannot discern exact temperatures (Hlad *et al*. 2024) and the fact that burnt bone from one individual cremation can be heterogeneous in size and colour due to factors such as the type of bone and where on the pyre the body part was situated. The preservation state of the cremated bones is crucial to how much information can be collected in such analysis (Hlad *et al*. 2024). Preservation can vary between site and between burials within a site, due to biological factors such as the age and sex of the deceased individual and their living weight (Innocenti *et al*. 2024) and cultural factors including the temperature of the pyre and how much cremated bone is considered necessary to complete a burial.

The burials, pit and pyre were excavated by hand and all debris from the contexts was collected and subject to visual inspection followed by sieving with a mesh size of 2mm. The weight of the burnt bone was taken following this process. Whilst it is recognised that a single sieving can contribute to the secondary reduction of osteological material, analysis has demonstrated that the percentage loss in weight is minimal (Budziszewki 2025). As it was not possible in most cases to identify individual bone elements these were not separated further so it was not possible to analyse for any bias in skeletal elements chosen for burial from the pyre (McKinley 1989; 1994). In the few instances where bone was identifiable either by animal species or by element in the human bone it was noted that these were mainly elements from the distal appendicular skeleton. In the case of the human bone this included a highly calcined distal section of a radius from the pit containing the redeposited pyre material and a fragmented distal hallux phalanx from burial M24-99. In the case of the identifiable fragments of animal bone these consisted of a phalange and a distal epiphysis of a tibia from a juvenile animal, both from small mammals. The latter was also not burnt at a temperature as high as some of the other bone recovered. It is possible that in the case of the human skeletons either bones that fell towards the edges of the pyre residue following cremation were picked, or that these bones were not subject to as high a temperature as the rest of the body and as such were easier to collect. For the animal bone it is likely that these represent joints of meat either eaten by mourners during the funeral rite or ritual offerings placed on the periphery of the pyre.

Overall, the amount of burnt bone recorded from each burial was small, ranging in weight from 10 to 228g. Similarly small weights of bone have been recorded at other Roman cemeteries, such as at Low Borrowbridge where only fourteen of the burials contained over 50g of burnt bone (McKinley 1996). This is in comparison to an average weight of about 1600 – 2000g from a modern adult cremation (McKinley 2000). The weight of bone recovered from cremation burials in Roman Britain is extremely variable (McKinley 2000) and although some loss of bone is expected due to taphonomic factors pre- and post-excavation (Budziszewki 2025) it appears that it was a rare occurrence for the whole of the remains of the body to be included in a cremation burial (McKinley 2016). Only a small selection of the burnt skeleton was clearly required for the mortuary act of burial (McKinley 2016). The remainder of the burnt bone was disposed of in a variety of ways, including in pits dug for the purpose, as found here and at other Roman cemeteries such as at Wall at the junction of Watling Street in Staffordshire (McKinley 2008; 2017), in the back fill of graves such as at Trentholme Drive, York (Wenham 1968: 27-28) and as more general spreads of debris as at Baldock – Area 15 (McKinley 1991) and Beckfoot (Howard-Davis *et al*. 2017). It has also been suggested that pyre material could be scattered in fields or in nearby rivers (Brownlee and Kleunäs 2024).

5.7 STRONTIUM ISOTOPE ANALYSIS

To assess the residential mobility of the individuals buried in the cemetery, strontium and lead isotope analyses of fully calcined bone from long bone fragments was undertaken (Moore and Montgomery 2025). At the time of writing, the results from the strontium isotopic analysis have been returned for six individuals. Strontium ($^{87}Sr/^{86}Sr$) isotope analyses can provide information on the movements of past populations by identifying individuals who have different isotopic compositions to the geographic area in which they were found (Evans *et al*. 2012). A direct link between an individual and their place of origin is given through strontium isotope ratios because animals and plants living in different geographic localities have different strontium isotope characteristics depending on the underlying rocks in their region of origin (Bentley 2006). Strontium taken into the body as food from these plants and animals is thus derived from local geology. Until recently, isotopic analysis was mainly undertaken on tooth enamel from unburnt bodies, however research on cremated skeletal remains has demonstrated that fully calcined bones can retain *in vivo* strontium isotope ratios (Snoeck *et al*. 2015). Calcined bone fragments from cremation burials

can therefore provide $^{87}Sr/^{86}Sr$ values that represent the geological region in which a person lived (Moore and Montgomery 2025).

The strontium isotope ratios for the Magna cremations range from 0.71041 to 0.71472, which are within the expected range for Britain (Evans *et al*. 2010). The Whin Sill, on which Magna is situated, is comprised of quartz diorite, an igneous intrusive rock, but the surrounding region is predominantly Carboniferous sedimentary limestone, mudrock and sandstone (Burt and Tucker 2020). This type of terrain is expected to produce bioavailable strontium isotope ratios between 0.7089 and 0.7125 (Evans *et al*. 2023). Only two of the contexts, the burial M24-172 and M24-84, the redeposited pyre material pit, revealed strontium isotope ratios consistent with local origins for the individual analysed. The remaining four samples have strontium isotope ratios over 0.7140, too high to have originated in Northumberland (Fig. 9). These results indicate that although these four individuals have their origins elsewhere, they likely came from the same place. The high ratios are characteristic of biospheres in regions of granites and gneisses Palaeozoic silicate rocks, which are predominantly found in southwest England, parts of Cumbria and northern Scotland in the United Kingdom. In Europe, suitable granitic or ancient geological terrains which are known to produce such isotope ratios in humans are primarily found in Spain, Portugal, Brittany, Ireland, the Central Massif, the Bohemian Massif, Fenno-Scandinavia and the Rhine Graben of southwest Germany. When compared to other Romano-British sites there are very few Roman period individuals with strontium isotope ratios as high as these; in fact, archaeological remains above 0.714 are rare in all periods in Britain (Evans *et al.* 2012). A small number of Roman individuals from Musselburgh, East Lothian, Driffield Terrace, York and Walbrook, London have revealed similarly high strontium isotope ratios and are thought to originate from the continental region of the Roman Empire (Moore *et al*. 2020; Montgomery *et al*. 2017; Montgomery *et al.* 2011). Further isotope analyses are pending from the cemetery, including of lead isotope ratios, and the interpretation of these will be given in more depth once all results have been assessed.

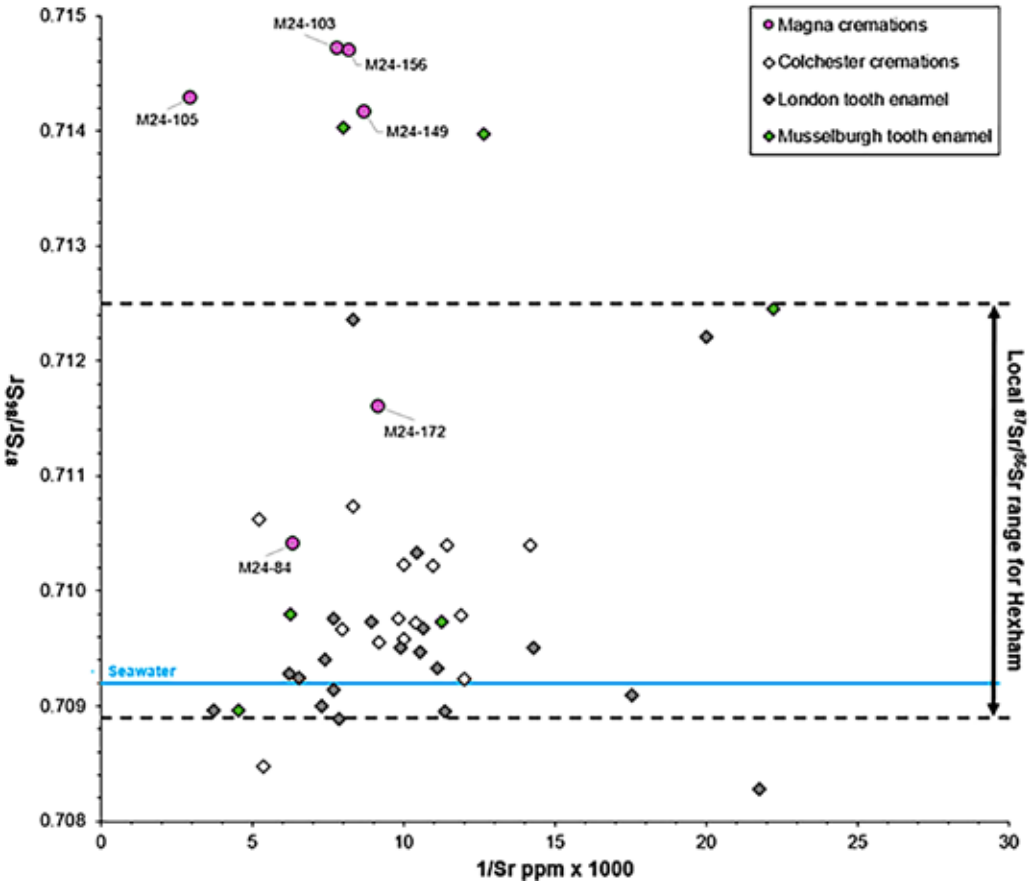

Figure 9: *Magna cremations strontium isotope data alongside the bioavailable strontium isotope range for Hexham (Evans* et al.*, 2023). Contemporaneous data from Moore* et al.*, (in prep), (2020) and Shaw* et al.*, (2016). The analytical error for $^{87}Sr/^{86}Sr$ is within the symbol.*

5.8 DISCUSSION

The northern frontier in Britain is characterised by having cremation burial as its predominant, though not only, funerary rite continuing into at least the 3rd century (Philpott 2016). Reconstructing a cremation burial is challenging because they leave only subtle evidence in the archaeological record, from the burning of the body to the subsequent burial of the remains. Focusing only on what survives of the interment in the archaeological record will not necessarily provide a representative impression of the full funerary rites employed (Pearce 2014). Textual evidence regarding Roman funerals suggests that an extended sequence of rituals was undertaken before, during, and after the burning of the body, where the resources of the participants allowed (Weekes 2014). Integrated analysis of the whole aspect of cremation burials, including the burnt bones, pyre debris, grave goods and the specific context of their location, is therefore crucial to gain insights into the funerary behaviours of the military community on the northern frontier and the groups of people represented by these burials. One of the most interesting aspects of this newly discovered cemetery at Magna is that all the cremation burials excavated were simple, un-urned deposits with no grave goods or accessory vessels. Apart from the potentially earliest burial, where the burnt bone and pyre remains collected with it appeared to have been placed directly into a wooden box, the remains from these cremations have been simply wrapped in tight bundles, presumably of cloth or other organic material, and buried directly into the subsoil. Just as the use of certain types of ceramic or glass containers for the burnt body was a cultural and social choice in Roman burial (Williams 2004), the interment of cremated remains in cloth bags was also a direct choice of those undertaking the burial.

It is often the most richly adorned graves that are highlighted as providing information about the populations of Roman sites, such as two burials from Carlisle (Hobson 2024) that have been interpreted as belonging to individuals recruited into the army and posted to Britain during the 1st century CE (Hobson 2024). Those burials without a substantial amount of burnt bone or grave goods can be neglected from more detailed analysis, such as one from St Nicholas' Yard in Carlisle, where calcined bone was found within a cremation burial but deemed not enough to be worthy of further analysis (Hobson 2024). When we excavate a cremation burial, however, no matter how much of the body is recovered and whether there are any observable grave goods or not, we are only seeing the final part of the full funerary rite. The rituals and behaviours that were experienced by the people participating in the funeral rite may have been just as, or even more important than the final burial itself. The actual process of interment may even have been one of the least important stages of the funeral (Booth 2017). It is therefore important to consider these aspects alongside the material remains, both skeletal and ceramic, and not exclude or marginalise the supposedly less informative burials such as the un-urned burials with few or no grave goods. These individuals may represent a discrete part of the society and, taking a holistic view of the evidence, we can attempt to work out who they may have been and why they received this treatment. Without this holistic view of all graves there will be a biased view of Roman burial practices and the society who performed them.

Williams (2004) discusses how the spectacle of the burning of a body would be an event that appealed to many human senses. This may have been the most important aspect of the whole cremation rite. When meat was burnt on the pyre, whether as food for the participants in the funeral or as an offering to the gods, the smell would provide a direct and powerful effect on the memory and help evoke a social memory for those attending (Williams 2004). The presence of animal bones in some of the burials and the evidence of pottery in the pyre remains demonstrates that at least in some cases, if not all, food and drink was part of the funerary sequence. Funerary rituals related to food and drink may show the status of the people participating in the event, along with that of the deceased. The presence of Samian ware in the remains of the pyre but not in the burials, for example, may be a show of conspicuous consumption, even when the final burial was relatively simple and unadorned. It has previously been noted (Howard-Davis *et al*. 2017) that Samian is not often found on northern cemetery sites, either as pyre or grave goods, but that when it is present there is often a military connection, with military communities more likely to use Samian in pyre ceremonies as appears to be the case here (Cool and Leary 2012: 306). Samian occurs in large quantities at Brougham, for example (Dickinson *et al*. 2004: 345-52). It is not, however, always present in military cemeteries, none having been found at Low Borrowbridge, Petty Knowes or Lanchester (Howard-Davis *et al*. 2017).

Another interesting finding of the Magna cemetery so far is that the radiocarbon dates and strontium isotope analyses show that although there are two distinct clusters of burials in terms of location, these do not conform to two distinct populations or time

periods. Ethnicity of buried individuals has often been assumed by the style of burial and associated grave goods in Roman cemeteries (Hobson 2024). At Brougham, for example, specific funerary rites were linked to possible homelands of the individuals in Pannonia and Germania (Cool 2004). Ethnic grouping has also been suggested at Pepper Hill, Southfleet in Kent based upon the identification of *busta* burials in the cemetery (Booth 2006). *Busta* graves are cremation burials where the burnt remains of the body were left *in situ* at the pyre site and the whole area buried. It was thought that this burial rite was introduced to Pepper Hill by soldiers from the Rhineland or Danube provinces (Booth 2006).

It is now believed that Magna, like other forts on the northern frontier, such as Birdoswald (Wilmott forthcoming), had more than one related cemetery. The main cemetery for Magna is believed to be situated to the east and southeast of the fort, though this has not yet been excavated (see Chapter 2.6.2). If, as the dating and strontium isotope results suggest, the groupings of the cemetery do not equate to separate ethnicities or simply time periods, there may be another social distinction at play here. The lack of grave goods and the simplicity of the burials may relate to social status and the burial place of the poorest members of the fort and its environs. This may include enslaved individuals. The importance of burial to all aspects of Roman society, both elite and non-elite, is upheld with the performative action of the cremation, and associated rituals such as the consumption or offerings of meat, but the final act in the burials excavated at Magna so far is one of simplicity and lack of demonstrable wealth. Pearce (2014) has discussed how burial can inform the study of social hierarchy in Roman Britain. He states that it would be 'curious' if the differences of rank and wealth were not echoed in funerary practices. At the cemetery at Brougham, which served a garrison community in the third century, the differentiation in graves shown by variation in grave deposits and personal ornamentation, have been identified as relating to the age and sex of the buried individuals (Cool 2004). It has even been suggested that the variation in the amount of bone collected after the cremation may reflect the social status of the deceased individual, regarding the amount of time and effort afforded to them in these secondary funerary rites (McKinley 2016). Identifying the poor and separating them from the enslaved in Roman archaeology is inherently extremely difficult (Redfern 2018; 2020) and therefore any such interpretation should be treated with caution and as only one potential reading of the evidence. Cremation with un-urned and unadorned burials may have been employed by many different social groups for many different reasons. The new findings from Magna, including the further analysis of strontium and lead isotopes, are adding to the understanding of the heterogeneous nature of funerary practice within Roman Britain (Smith *et al*. 2018) and the potential social differentiation being displayed within these various rites.

6. ARCHAEOBOTANICAL REPORT

DR HANNAH RUSS

Archaeobotanical analysis has been undertaken on the bulk environmental samples taken during the excavations thus far. The remains from the 2023 and 2024 excavations have been analysed and reported on separately below; for further information on the former please refer to the 2023 interim report (Frame *et al*. 2024).

6.1 ENVIRONMENTAL REMAINS FROM EXCAVATIONS AT MILECASTLE 46 IN 2023

6.1.1 INTRODUCTION

Bulk environmental samples were taken during archaeological excavations at milecastle 46, Magna, Northumberland, by The Vindolanda Trust in 2023. In total, flots from 27 bulk environmental samples (557 litres of sediment) were sorted and analysed to provide the results and discussion presented in this report. The site is located within the Frontiers of the Roman Empire (Hadrian's Wall) World Heritage Site (Historic England list entry number: 1000098) and the scheduled area of Carvoran Roman fort and Hadrian's Wall and *vallum* between the unclassified road to Old Shield and the field boundary west of the fort in wall miles 45 and 46 (Historic England list entry number: 1010991). The samples were taken from features dated to the Roman period, from the late 2nd to 4th centuries CE and included eight pits, two deposit/layers, a well, a gully, a human inhumation grave and a truncation feature.

6.1.2 METHODS

The samples were taken during excavations in 2023 and processed by The Vindolanda Trust in 2024. The sample flots were sorted and analysed in accordance with Historic England guidelines for environmental archaeology (Campbell *et al*. 2011) and national standards and guidelines (CIfA 2014; 2021).

The light fractions/flots were sorted under a low power light microscope at x10 to x60 magnification, with any artefactual or environmental remains extracted for identification. The presence of 'recent' material in the light fractions, such as root fragments and unmodified plant remains, was recorded on a scale of abundance as follows: ***abundant, **common, *rare. Flots that were dominated by fine clumping roots were gently disaggregated by hand to separate any relevant materials.

The samples contained several waterlogged, charred and recent seeds and plant materials, which were identified under a low power light microscope at x10 to x60 magnification using the archaeology.biz reference collection and published guides (Digital Plant Atlas; Cappers *et al*. 2006; Jones *et al*. 2004; Delorit 1970). Seeds and other plant parts were extracted from the flots into sample tubes, and were forwarded to Jacqui Huntley for consideration alongside a previous version of this report and supporting excel spreadsheet. This issue of the report has been updated to reflect feedback on identifications and presentation of the data. Plant nomenclature follows Stace (2019). Quantification was by count, where a grain/seed/fruit with 51-100% surviving quantified separately from fragments representing 50% or less of the complete grain/seed.

Charcoal over 4mm was quantified by count and weight, while fragments under 4mm were recorded on a scale of abundance. Charcoal suitable for fracturing was identified using an AmScope compound microscope with darkfield/brightfield and magnification range from x40 to x2000, with reference to published identification guides (Schoch *et al*. 2004; Hather 2000; Fahn *et al*. 1985).

Animal bone was identified using the archaeology.biz reference collection and in the case of the newt vertebra, Ratnikov and Litvinchuk (2007). Two leather fragments were identified to species using Varghese *et al*. (2020).

Results were recorded in an electronic proforma in Microsoft Excel.

6.1.3 RESULTS AND DISCUSSION

Flots from 27 bulk environmental samples from 20 contexts across 14 archaeological features (557 litres of sediment) from milecastle 46, Magna, Northumberland, were sorted and the extracts identified and quantified (Table 1 and Table 2). All the samples were taken during the 2023 excavations at the site. The sampled features dated to the Roman period, from the late 2nd to 4th centuries CE and included eight pits, two deposit/layers, a well, a gully, a human inhumation grave and a truncation feature.

The flots contained a range of materials that can be associated with human activity and/or natural

accumulation within features at the site (Table 1 and Table 2). The plant remains included charred, waterlogged and recent specimens representing a range of domestic and wild taxa indicative of human cultivation and dietary practices as well as environmental conditions at and in the vicinity of the site (Table 3 to Table 5). Bone was noted in several of the flots and is discussed in more detail below. Bioturbation proxies included untransformed (recent) plant roots and earthworm capsules. Fungal sclerotia were present in 22 samples (Table 1).

6.1.3.1 SLAG, MICROSLAG AND HAMMERSCALE

Slag and/or microslags were recovered from two features: the late 2nd century pit M23-079 and the 4th century grave M23-062 (Table 1). The recovery of these remains indicates that high-temperature activities were taking place at or close to the site; however, the slags could not be identified as resulting from any specific activity. Spheroidal hammerscale was recovered from the flots from three features: the upper, 3rd century, fill of pit M23-057, 3rd century fill of gully M23-083 and 4th century grave M23-062. Hammerscale is produced during iron working and as such the remains provide evidence for iron working (not smelting) at the site. Experimental work has indicated that spheroidal hammerscale is produced during traditional fire-welding - joining two pieces of metal by heating them to a high temperature and then hammering them together (Dungworth and Wilkes 2007).

6.1.3.2 COAL

Small fragments of coal were observed in five samples, four of which were from 4th century grave M23-062 and one from late 2nd century pit M23-079. While coal was mined and used in Britain during the Roman period (e.g. Dearne and Brannigan 1995; Travis 2008), coal occurs naturally in the local area, with the site located close to coal outcrops and coal workings (Coal Authority 2024). It was not possible to determine if the coal fragments resulted from mining during the Roman period, if they are intrusive and resulted from later activity at the site, or if they are naturally occurring.

Date	Late 2nd Century					3C	L2C	3C	L2C	3rd Century									4th Century									
Feature	Pit [039]	Pit [066]		Pit [079]	Pit [057]		Pit [092]		Well [060]			Gully [083]	Layer [072]			Pit [064]	Pit [070]	Feature [087]	Grave [062]							Layer [058]	Pit [038]	
Context (M23-)	009	097		046	056	051	078	052	091	061	088	084	072			065	069	085	063	063/071	071					058	037	
Sample (MES2023-)	033	029	030	017	006	005	015	014	026	016	027	025	011	032	033	010	022	023	009	008	019	018	020	021	024	007	004	Total
Sample volume (l)	20	10	10	45	1	25	40	50	10	30	15	20	30	10	10	15	30	5	40	20	30	25	15	15	15	1	20	557
Bone				1								4								**	1*	*	**		**			6
Bone-human																				*		*		***				-
Leather fragments <2cm									2		1																	3
Insect (body parts)									8		8												1					17
Insect (*pupae* fragments)									3		2							2										7
Worm capsule				*				*	*		*	*								**	*						*	-
Fungal sclerotia	5	25	14	5		2	39		7	4	13	5	61	36	37		3		1	1	5	5	7	3	8	1		287
Roots (recent)	**	*	*	***	**	**	*	**	*	**	*	***	**	***	*	*	***	*	**	***	*	**	**	*	*	**	**	-
Wood fragment								*	1																			1
Slag				10																				1				11
Microslag																						*						-
Hammerscale						1						1											1	1				4
Coal				*																	*		*	*	*			-
Charcoal >4mm	8			1						3	12		1		19	3		32	1	7		16			9		12	124
Charcoal <4mm	***	*	*	**	***	***	***	***		**	**	**	**	***	***	*	***	*		**	**	***	**		**	**	***	-
Plant remains	16	7		6			20	7	71	5	71	2	3		5		1		5		2	1	2	2	6			232
Total	29	32	14	23	0	3	59	7	92	12	107	12	65	36	61	3	4	34	7	8	8	22	11	7	23	1	12	692

Table 1: *Summary of remains recovered from flots from samples from milecastle 46, count/abundance. Abundance: ***abundant, ** common, * rare.*

Date		Late 2nd Century					3C	L2C	3rd Century						4th Century							
	Feature	Pit [039]	Pit [066]	Pit [079]	Pit [092]			Well [060]			Gully [083	Layer [072]		Pit [070]	Grave [062]							
	Context (M23-)	009	097	046	078	052		091	061	088	084	072		069	063	063/071		071				
	Sample (MES2023-)	003	029	017	015	014		026	016	027	025	011	033	022	009	008	019	018	020	021	024	Total
Taxon	Sample volume (l)	20	10	45	40	50		10	30	15	20	30	10	30	40	20	30	25	15	15	15	470
Triticum sp. - wheat	Grain	1			3	1															1	6
Hordeum hulled - barley	Grain	4			2																	6
Hordeum undifferentiated - barley	Grain	3												1								4
Avena sp. - oat	Grain			2																		2
Cereal - indeterminate	Grain	1			2					1					1							5
Gramineae 2-4mm	Grain														1							1
Gramineae <2mm	Grain							1		3												4
cf. *Gramineae* <2mm	Grain		1																			1
Gramineae	Floret										1											1
	Node/stem		5		4	2						2									1	14
	Spikelet																				1	1
Rubus fruticosus - blackberry	Endocarp								1				2							1		4
Rubus idaeus - raspberry	Endocarp								2								1		1			4
Rubus sp. - raspberry/blackberry	Endocarp														1							1
? *Fragaria* sp. - strawberry	Fruitlet									3												3
Corylus avellana - hazel	Nutshell	4			1	1																6
Fabaceae - bean family	Seed														1							1
?*Fabaceae* - bean family	Half seed				1																	1
Raphanus rapanistrum - wild radish	Pod segment	1																				1
Alnus - alder	Fruit										1											1
Betula? - birch	Tree bark rolls									6												6
Calluna vulgaris - heather	Flower/fruit/shoot							23														23
cf. *Epilobium* sp. - willowherb	Fruit							1		2												3
cf. *Ranunculus repens*-type - buttercup	Fruitlet												1									1
Cirsium sp. - thistle	Fruit	1				1																2
Asteraceae cf. *Cirsium* sp. - thistle	Fruit				1																	1
Galeopsis tetrahit - common hemp-nettle	Fruitlet							1		25												26
Montia fontana ssp. *chondrosperma* - blinks	Seed								1													1
Persicaria lapathifolia - pale persicaria	Seed	1								1												2
Persicaria lapathifolium/P. maculosa - pale persicaria/redshank	Seed									2												2
Polygonum aviculare - knotgrass	Seed									1												1
? *Polygonaceae* - knotweed family	Fruit											1										1
Potentilla erecta-type - cinquefoil	Fruitlet					1		12		4												17
Prunella vulgaris - selfheal	Fruitlet							1		1												2
Rumex acetosa - common sorrel	Fruit								1													1
Rumex cf. *acetosa* - common sorrel	Fruit									1												1
Rumex obtusifolius-type - dock	Fruit							3														3
Rumex acetosella - sheep's sorrel	Fruit				1																	1
Rumex acetosella - sheep's sorrel /*Carex* sp. - sedge	Fruit									1					1							2
Carex lenticular - sedge	Fruit					1		3		4												8
Carex trigonous - sedge	Fruit				2			7		12							1		1			23
cf. *Carex trigonous* - sedge	Fruit												2									2
Plantago lanceolata - ribwort plantain	Seed				1																	1
Stellaria media - common chickweed	Seed							4		2												6
Urtica dioica - common nettle	Fruit			1						1												2
? *Mentha* sp. - mint	Fruitlet																			1		1
Bryophyta - moss	Stem/leaves							**		*												-
	Spore capsule							13		1												14
Pteridium sp. - bracken	Frond fragment							2														2
Monocot	Stem/base			2																		2
Indeterminate	Culm node		1																			1
	Plant parts																	1				1
	Seed				2																3	5
	Twig w/bud scars			1																		1
	Total	16	7	6	20	7		71	5	71	2	3	5	1	5		2	1	2	2	6	232

Table 2: *Plant remains from flots from bulk environmental samples from milecastle 46 in 2023.*

6.1.3.3 BONE

Bone was present in the flots from eight samples from three features: grave M23-062, pit M23-079 and gully M23-083.

The bone recovered from three samples, including from contexts M23-063 and M23-071, and fills of grave M23-062, included small fragments of mammal bone consistent with human remains; none were identifiable to element (Table 1). Bone from grave M23-062, also included the remains of microfauna; two specimens were identified as shrew (*Sorex/Neomys*) and newt (*Pleurodelinae*). The newt vertebra could represent any of the three species native to England, the smooth newt (*Lissotriton vulgaris*), the palmate newt (*Lissotriton helveticus*) or the great crested newt (*Triturus cristatus*); however, smooth newt is the most likely species in this context.

A single fragment of bone from pit M23-079 (context M23-046, sample MES2023-017) could only be identified as medium/large mammal. Four fragments of tooth enamel from gully M23-083 (context M23-084, sample MES2023-025) represented the remains of a single deciduous pig (*Sus* sp.) tooth.

6.1.3.4 LEATHER

Two small fragments of leather were recovered from a flot from well M23-060. Both fragments had surface morphology consistent with cattle leather (Varghese *et al*. 2020). Larger fragments were recovered from the well by hand during excavations and reported on elsewhere (see Chapter 4, Cat. Nos 1-3).

6.1.3.5 WOOD CHARCOAL

Wood charcoal was present in 26 of the flots (Table 1), but few fragments were sufficiently well preserved or of a size suitable for undertaking wood species identification. Seven fragments of charcoal from pit M23-039 (context M23-009, sample MES2023-003) were larger, and identification indicated that they represented willow/poplar (*Salix/Populus*) and apple sub-family (*Maloideae*). The only other sample with charcoal suitable for identification was that from M23-088 (sample MES2023-027), the secondary fill of well M23-060; six fragments were identified as ash (*Fraxinus* sp.), willow/poplar, hazel (*Corylus avellana*), oak (*Quercus*), and possible stonefruit (*Prunus*). These preliminary results are provided to form a baseline for developing a strategy for the analysis of charcoal recovered over the current series of excavations at milecastle 46.

The possible six species of tree identified in the wood charcoal assemblage include those recorded frequently at Roman period archaeological sites in northern England (e.g. Huntley 2007; 2010). Work on wood and charcoal from Roman period deposits at Vindolanda, also provided similar results, noting oak, hazel, birch (*Betula*), cherry (*Prunus*), willow and ivy (*Hedera*) (Blackburn 1970, 145; Huntley 2007).

6.1.3.6 PLANT REMAINS

Plant remains were recovered in charred, waterlogged, and 'untransformed' condition, with the latter thought to represent recent inclusions in the deposits/samples (Table 3 to Table 5).

Charred remains are likely to represent plants that were being utilised or impacted by people at milecastle 46 as it is unlikely that naturally charred plant remains would become part of the archaeological deposits. Plant remains become charred through a range of different processes; these include accidents during drying and/or cooking, the clearance of land by fire, discard of food waste in hearths or kilns, and the destruction/discard of spoiled food by burning. The seeds of weeds can become charred when harvested alongside cultivated crops and subsequently included in the drying process.

Plant remains are preserved by waterlogging as a result of the absence of oxygen. At milecastle 46, the fills of well M23-060 were waterlogged and contained waterlogged plant remains as well as three charred specimens (Table 3). Other samples had occasional plant remains preserved by waterlogging (Table 4 and Table 5). Waterlogging can preserve the remains of cultivated and wild plants exploited by people for food, medicine, fuel and other purposes, but also naturally occurring remains accumulated through seed fall and the droppings and pellets of animals.

It is common to recover plant seeds and fruits in their natural state (untransformed) in flots from bulk environmental samples. These specimens usually represent recent intrusions within a sample; these can include seeds that have entered the deposit though natural processes such as bioturbation, or contamination during sampling, which is particularly common during the summer and autumn months in the UK when many plants produce their seeds. Untransformed plant parts usually reflect the vegetation in the immediate vicinity of the site in recent times.

Well M23-060

The flots from three samples from waterlogged deposits from well M23-060 dated to the late 2nd century (M23-091) and 3rd century CE (M23-061 and M23-088) (Table 3). In addition to waterlogged remains, three charred specimens were identified in the 3rd century deposits, a fruit of common sorrel (*Rumex acetosa*) from M23-061, and an indeterminate cereal grain and common hemp-nettle fruitlet (*Galeopsis tetrahit*) both from M23-088 (Table 3). The waterlogged material from 2nd century deposit M23-091 (n=72) was dominated by the remains of heather (*Calluna vulgaris*), including flowers, fruits and shoots, moss (*Bryophyta*), including leaves and stems as well as spore capsules, cinquefoil fruitlets (*Potentilla erecta*-type), and sedges (*Carex* species) (Table 3). The sample also included smaller numbers of common chickweed seeds (*Stellaria media*, n=4), dock fruits (*Rumex obtusifolius*-type, n=3), bracken frond fragments (*Pteridium* sp., n=2), fruitlets of selfheal (*Prunella vulgaris*, n=1) and common hemp-nettle (n=1), a possible willowherb fruit (cf. *Epilobium* sp.), and a <2mm grass grain (*Gramineae*). The sample from 3rd century fill M23-061 contained few archaeobotanical remains (n=5; Table 3); in addition to the charred common sorrel fruit, waterlogged endocarps of raspberry (*Rubus idaeus*, n=2) and blackberry (*Rubus fruticosus*, n=1), and a blinks seed (*Montia fontana* ssp. *chondrosperma*) were recovered, none of which were recorded in the other samples from the well. The 3rd century fill M23-088 (n=71) contained similar quantities of remains as the late 2nd century fill M23-091, but these were different in composition. The waterlogged plant remains from fill M23-088 were dominated by common hemp-nettle fruitlets and sedge fruits, with no heather and only rare moss remains. Other waterlogged plant remains from fill M23-088, all recovered in small numbers, included cinquefoil (n=4), <2mm grass grains (n=3), possible strawberry fruitlets (?*Fragaria* sp., n=3), willowherb fruits (n=2), common chickweed seeds (n=2), pale persicaria or redshank seeds (*Persicaria lapathifolia/ Persicaria maculosa*, n=2), a pale persicaria seed (n=1), a knotgrass seed (*Polygonum aviculare*, n=1), a selfheal fruitlet (n=1) and fruits of probable common sorrel (*Rumex* cf. *acetosa*, n=1), sheep's sorrel or sedge (*Rumex acetosella/Carex* sp., n=1), and common nettle (*Urtica dioica*, n=1). The lower fill M23-088 also contained frequent bark fragments, some of which were preserved as rolls. This rolling can occur naturally in some tree species, such as birch (*Betula*).

Late 2nd century and 3rd century features

In addition to the well (see above), the flots from seven other late 2nd and 3rd century features or deposits contained plant remains (Table 4). In total, nine samples from eight contexts from seven features contained waterlogged, charred and/or recent plant remains; the features included five pits, a gully and a layer.

Late 2nd century features included four pits with plant remains recovered from single fills except for pit M23-092, which had a lower late 2nd century fill and an upper fill of 3rd century date (Table 4). The 3rd century features, in addition to the upper fill of pit M23-092, included a pit, a gully, and a layer. None of the features contained large assemblages of plant remains; late 2nd century fills of pits M23-039 and M23-092 had 16 and 27 specimens, respectively, while the remaining features ranged from 1 to 8 specimens. Most of the plant remains from the late 2nd and 3rd century features were preserved by charring, with only four waterlogged and two recent specimens recorded (Table 4).

Four of the pits contained charred cereal remains (Table 4). The largest assemblage of cereal remains was recovered from late 2nd century pit M23-039, which comprised four grains of hulled barley (*Hordeum vulgare*), three grains of undifferentiated barley, a wheat grain (*Triticum* sp.) and an indeterminate cereal grain. The fills of pit M23-092 also contained wheat (n=4), barley (undifferentiated; n=2) and indeterminate cereal grains (n=2), as well as fragments of charred node/stem (n=6). The 2nd - century pit M23-079 contained two charred oat (*Avena* sp.) grains, while 3rd century pit M23-070 contained a single undifferentiated barley grain (Table 4).

Other remains that might be associated with human diet included two charred blackberry endocarps from 3rd century pit M23-072, charred hazel nutshell from late 2nd century pit M23-039, and late 2nd and 3rd century fills of pit M23-092, half of a possible bean family seed (*Fabaceae*) from the late 2nd century fill of pit M23-092 and a charred pod segment of wild radish (*Raphanus raphanistrum*).

Additional charred plant remains were recovered in very small numbers from late 2nd and 3rd century features, but included sedge fruits (n=5), a buttercup fruitlet (n=1), a pale persicaria seed (n=1), a possible knotweed family fruit (?*Polygonaceae*; n=1), a cinquefoil fruitlet (n=1), a sheep's sorrel fruit (n=1), and a ribwort plantain seed (*Plantago lanceolata*; n=1).

	Feature	Well [060]					
	Date	Late 2	3rd century				
	Context (M23-)	091	061		088		
	Sample (MES2023-)	026	016		027		
Taxon	**Part**	**wl**	**ch**	**wl**	**ch**	**wl**	**Total**
Cereal - indeterminate	Grain				1		**1**
Gramineae <2mm	Grain	1				3	**4**
Rubus fruticosus - blackberry	Endocarp			1			**1**
Rubus idaeus - raspberry	Endocarp			2			**2**
? *Fragaria* sp. - strawberry	Fruitlet					3	**3**
Betula? - birch	Tree bark rolls					6	**6**
Calluna vulgaris - heather	Flower/fruit/shoot	23					**23**
cf. *Epilobium* sp. - willowherb	Fruit	1				2	**3**
Galeopsis tetrahit - common hemp-nettle	Fruitlet	1			1	24	**26**
Montia fontana ssp. chondrosperma - blinks	Seed			1			**1**
Persicaria lapathifolia - pale persicaria	Seed					1	**1**
Persicaria lapathifolium/P. maculosa - pale persicaria/redshank	Seed					2	**2**
Polygonum aviculare - knotgrass	Seed					1	**1**
Potentilla erecta-type - cinquefoil	Fruitlet	12				4	**16**
Prunella vulgaris - selfheal	Fruitlet	1				1	**2**
Rumex acetosa - common sorrel	Fruit		1				**1**
Rumex cf. *acetosa* - common sorrel	Fruit					1	**1**
Rumex obtusifolius-type - dock	Fruit	3					**3**
Rumex acetosella - sheep's sorrel /Carex sp. - sedge	Fruit					1	**1**
Carex lenticular - sedge	Fruit	3				4	**7**
Carex trigonous - sedge	Fruit	7				12	**19**
Stellaria media - common chickweed	Seed	4				2	**6**
Urtica dioica - common nettle	Fruit					1	**1**
Bryophyta - moss	Stem/leaves	**				*	
	Spore capsule	13				1	**14**
Pteridium sp. - bracken	Frond fragment	2					**2**
	Total	**71**	**1**	**4**	**2**	**69**	**147**

Table 3: *Plant remains from Late 2nd to 3rd century well M23-060 at milecastle 46, count. Preservation: ch = charred, wl = waterlogged.*

Waterlogged remains included thistle or probable thistle fruits (*Cirsium* sp.) from pits M23-039 and M23-092 and a common nettle fruit from pit M23-079. The plant remains from the flot from gully M23-083 (M23-084) were untransformed and considered recent; these included a grass floret and an alder fruit (*Alnus*).

Date		Late 2nd Century									3rd Century				
Feature		Pit [039]		Pit [066]	Pit [079]		Pit [092]				Gully [083]	Layer [072]		Pit [070]	
Context (M23-)		009		097	046		078		052		084	072		069	
Sample (MES2023-)		003		029	017		015		014		025	011	033	022	
Taxon	**Part**	**ch**	**wl**	**ch**	**ch**	**wl**	**ch**	**wl**	**ch**	**wl**	**r**	**ch**	**ch**	**ch**	**Total**
Triticum sp. - wheat	Grain	1					3		1						5
Hordeum hulled - barley	Grain	4					2								6
Hordeum undifferentiated - barley	Grain	3												1	4
Avena sp. - oat	Grain				2										2
Cereal - indeterminate	Grain	1					2								3
cf. *Gramineae* <2mm	Grain			1											1
Gramineae	Floret										1				1
	Node/stem			5			4		2			2			13
Rubus fruticosus - blackberry	Endocarp												2		2
Corylus avellana - hazel	Nutshell	4					1		1						6
?*Fabaceae* - bean family	Half seed						1								1
Raphanus rapanistrum - wild radish	Pod segment	1													1
Alnus - alder	Fruit										1				1
cf. *Ranunculus repens*-type - buttercup	Fruitlet												1		1
Cirsium sp. - thistle	Fruit		1							1					2
Asteraceae cf. *Cirsium* sp. - thistle	Fruit							1							1
Persicaria lapathifolia - pale persicaria	Seed	1													1
? *Polygonaceae* - knotweed family	Fruit											1			1
Potentilla erecta-type - cinquefoil	Fruitlet								1						1
Rumex acetosella - sheep's sorrel	Fruit						1								1
Carex lenticular - sedge	Fruit								1						1
Carex trigonous - sedge	Fruit						2								2
cf. *Carex* trigonous - sedge	Fruit												2		2
Plantago lanceolata - ribwort plantain	Seed						1								1
Urtica dioica - common nettle	Fruit					1									1
Monocot	Stem/base				2										2
Indeterminate	Culm node			1											1
	Seed						2								2
	Twig with bud scars				1										1
	Total	**15**	**1**	**7**	**5**	**1**	**19**	**1**	**6**	**1**	**2**	**3**	**5**	**1**	**67**

Table 4: *Plant remains from Late 2nd and 3rd century features and deposits at milecastle 46, count. Preservation: ch = charred, wl = waterlogged, r = recent.*

Date		4th Century									
Feature		Grave [062]									
Context (M23-)		063	063/071		071						
Sample (MES2023-)		009	019		018	020		021		024	
Taxon	Part	ch	ch	wl	ch	ch	wl	ch	wl	ch	r	Total
Triticum sp. - wheat	Grain									1		1
Cereal - indeterminate	Grain	1										1
Gramineae 2-4mm	Grain	1										1
Gramineae	Node/stem									1		1
	Spikelet										1	1
Rubus fruticosus - blackberry	Endocarp								1			1
Rubus idaeus - raspberry	Endocarp			1			1					2
Rubus sp. - raspberry/blackberry	Endocarp	1										1
Fabaceae - bean family	Seed	1										1
Rumex acetosella - sheep's sorrel /*Carex* sp. - sedge	Fruit	1										1
Carex trigonous - sedge	Fruit		1			1						2
? *Mentha* sp. - mint	Fruitlet							1				1
Indeterminate	Plant parts				1							1
	Seed									3		3
	Total	5	1	1	1	1	1	1	1	5	1	18

Table 5: *Plant remains from 4th century grave M23-062 at milecastle 46, count. Preservation: ch = charred, wl = waterlogged, r = recent.*

4th century grave M23-062

The only 4th century samples to contain plant remains were from grave M23-062; six samples from two contexts within the grave contained a total of 18 specimens, 14 charred and 3 waterlogged (Table 5). One grass spikelet from sample MES2023-024 was considered intrusive/recent. Charred plant remains included a wheat grain, an indeterminate cereal grain, a 2-4mm grass grain, a grass node/stem, an endocarp of raspberry or blackberry (*Rubus* sp.), a very small bean family seed, a sheep's sorrel or sedge fruit, two sedge fruits, a possible mint fruitlet (*Mentha* sp.), three indeterminate seeds and an indeterminate plant part (Table 5). The waterlogged remains were endocarps of raspberry (n=2) and blackberry (n=1).

6.1.3.7 FUNGAL SCLEROTIA

Fungal sclerotia, in this case black spherical specimens ranging in size from 0.5mm to 4mm in diameter, formed of hardened fungal mycelium and created by some fungi as a food reserve, were recovered from 22 samples from 11 features. The species of fungus could not be identified, and it is uncertain if their presence is related to fungal activity during the Roman period, or more recently. Fungal sclerotia are common finds in flots recovered from bulk environmental samples, but the nature of their accumulation has yet to be understood.

6.1.3.8 BIOTURBATION PROXIES

Bioturbation proxies included untransformed (recent) roots and earthworm capsules.

Roots

Untransformed (i.e. recent) roots were present in all 27 flots, ranging in abundance from 'rare' to 'abundant'. As plant roots grow through archaeological features, they can disturb archaeological remains, especially smaller items such as those recovered via flotation. As such, it is important to note that deposits with high concentrations of roots may contain intrusive and/or residual material that has been translocated by root action. Five samples had 'abundant' roots, grave M23-062, pits M23-070 and M23-079, layer M23-072, and gully M23-083.

Earthworm Capsules

Earthworm capsules were observed in eight flots from six features, pits M23-038, M23-079 and M23-092, grave M23-062, well M23-060, and gully M23-083 (Table 1). As is the case for rooting (see above), the action of earthworms can lead to the translocation of specimens within the archaeological record and as such their presence is an indication of potential for intrusive and/or residual specimens within that context.

6.1.4 CONCLUSION

The remains recovered from bulk environmental samples taken in 2023 have provided an important insight into human diet and economy as well as information for understanding past environmental conditions at milecastle 46.

The slag, microslag and hammerscale are indicative of high-temperature activities including iron working. These remains should be included in any analysis undertaken on other high-temperature activity related remains recovered via hand-collection during excavations. The small fragments of coal recovered from the flots do not add any information that contributes to understanding human activity at milecastle 46 during the Roman period.

The animal bone recovered from the flots provided evidence for pig, shrew and newt (likely smooth newt) at the site. The pig tooth is likely indicative of the consumption of pork as would be expected at this type of site during the Roman period; the shrew and newt remains contribute to the visualisation of the natural environment at milecastle 46 during the Roman period. The newt remains are indicative of freshwater environments at or close to the site, which is consistent with conditions at the site in recent times. The extremely fragmentary human remains are almost certainly additional material associated with the inhumation in grave M23-062. The leather fragments provide evidence for the exploitation of cattle for their hides, a subject that is mentioned in the Vindolanda writing tablets (*Tab. Vindol*. 343, Bowman and Thomas 1994).

The small assemblage of charcoal recovered demonstrated the use of up to six wood species, providing evidence for the types of trees present in the area surrounding the site and information on wood at the site during the Roman period. The species recorded are broadly comparable with those recovered at other Roman period sites in northern England, including other Hadian's Wall sites (Huntley 2010). An obvious absence in the charcoal assemblage is birch, which may be represented in the well by bark rolls but was not present in the charcoal assemblage. This may be a result of small sample size. A research strategy that focusses on answering questions regarding wood use, fuel selection and the composition of local woodland will be agreed once this current series of excavations has been completed and the resulting charcoal assemblages can be considered holistically.

The plant remains are consistent with those expected at a Roman period site in northern England (e.g. Huntley and Stallibrass 1995, 42-59), including charred remains of three of the main cultivated cereal species (wheat, barley and oat), legumes, as well as the remains of native fruit and nuts that could have been grown but more likely collected as wild foods, such as blackberry, raspberry, and hazelnut. While the dataset is small, there are some tentative patterns arising, such as cereal remains being more common in the late 2nd century, where raspberry and blackberry are only present in 3rd and 4th century features (Table 2). The wild radish, represented by a single charred seed pod fragment from late 2nd century pit M23-039 is not considered a plant native to Britain, but is thought to have been introduced at some point during the prehistoric period, though any precise date has not been suggested. All parts of this plant are edible, but it does not produce a purple/pink bulbous root one might envision when thinking of radishes; the root is white and long, akin to a young carrot in shape. It has been found at other Roman sites along Hadrian's Wall, including Vindolanda and Birdoswald (Huntley 1991), and radish is also mentioned in one of the Vindolanda writing tablets (Bowman and Thomas 1994, 276 *Tab. Vindol*. 301; Cool 2006, 126). Mint has been identified within Roman period assemblages in Britain (e.g. van der Veen *et al*. 2008, 13); several wild forms of mint are native to Britain, but it is thought that it was during the Roman period that these plants came into use as a flavouring, and medicinally (*op. cit*.); however, the identification was tentative and there was only a single specimen, and as such no further comment is possible. There was no evidence for any of the many plant species introduced to Britain during the Roman period (e.g. van der Veen 2008).

Overall, the remains form a small assemblage that is too small for any further analysis at this time; this may change depending on the material recovered during future years of excavations that are planned at the site. To place the material from milecastle 46 fully within its chronological and geographical context, a more exhaustive review of the findings should be undertaken once this series of excavations have been completed, with comparisons to published assemblages (see Huntley and Stallibrass 1995 and Huntley 2010, and references within) and especially those for other Hadrian's Wall sites.

6.1.5 ACKNOWLEDGEMENTS

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I would like to thank Franki Gillis, Geoarchaeologist,

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6.1.6 RECOMMENDATIONS

The remains recovered from the flots studied in this analysis should be retained within the site archive. This report and associated data should be retained within the site archive and integrated into any sitewide grey literature or publication reporting.

The slag, microslag, hammerscale, and leather recovered from the flots should be forwarded to the relevant specialist for inclusion in their reporting. The information included in this report on the animal remains should be incorporated into the report with any hand-collected animal bone.

For wood charcoal, a research strategy that focusses on answering questions regarding wood use, fuel selection and the composition of local woodland will be agreed once this current series of excavations has been completed and the resulting charcoal assemblages can be considered holistically.

The results presented here should be integrated with those from additional future excavations undertaken at the site to produce a single final report.

6.2 ENVIRONMENTAL REMAINS FROM EXCAVATIONS SOUTH OF MILECASTLE 46 IN 2024

6.2.1 INTRODUCTION

Bulk environmental samples were taken during archaeological excavations to the south of milecastle 46, Magna, Northumberland, by The Vindolanda Trust in 2024 (M24). In total, flots from 17 bulk environmental samples (313 litres) were sorted and analysed to provide the results and discussion presented in the report. Fourteen hand-collected charcoal samples were assessed for potential for identification and analysis. The bulk environmental samples were taken from features mostly dated to the Roman period, from the Late Prehistoric period to the 4th century CE and included ten ditches, three pits, and two, possibly three, cremation features. The samples were taken in order to understand the type and level of preservation in archaeological deposits at the site, and to provide information on human diet and economy as well as past environmental conditions.

6.2.2 METHODS

The samples were processed by The Vindolanda Trust in 2024. The sample flots were sorted and analysed in accordance with Historic England guidelines for environmental archaeology (Campbell *et al*. 2011) and national standards and guidelines (ClfA 2014; 2021).

The light fractions/flots were quantified by weight to the nearest 0.01g and by estimated volume to the nearest 5ml. They were sorted under a low power light microscope at 10x to 60x magnification, with any artefactual or environmental remains extracted for identification. The presence of charcoal <4mm and 'modern' materials in the light fractions, such as root fragments, were recorded on a scale of abundance. The abundance scale for all materials was as follows: *** abundant, ** common, *rare, with blank cells indicating absence.

Archaeobotanical remains were identified under a low power light microscope at 10x to x60 magnification using the archaeology.biz reference collection and published identification guides (Digital Plant Atlas; Cappers *et al*. 2006; Jones *et al*. 2004; Delorit 1970). Plant taxonomy followed Stace (2019 (2024 reprint)). Quantification was by count, where a grain/seed with 51-100% surviving was quantified separately from fragments representing 50% or less of the complete grain/seed. The flots were sorted by the report author, and extracted remains identified as outlined above. After identification, the flots and tubes of extracted materials were forwarded to Jacqui Huntley. The two independent sets of identification data were compared and a final version of data agreed for inclusion in this reporting.

Charcoal was recovered via three collection methods: charcoal samples were taken on site comprising larger fragments of hand-collected specimens, and charcoal was recovered from the heavy and light fractions of the bulk environmental samples. Charcoal larger than 4mm was recorded by count (estimated for large samples) and weight to the nearest 0.01g. Charcoal under 4mm was quantified by abundance and by weight, again to the nearest 0.01g. Each sample was assessed for the presence of roundwood that would be suitable for radiocarbon dating and allocated a category for potential for analysis/identification work from high to low. Potential was assessed based on the condition and size of the charcoal fragments.

Results were recorded in an electronic proforma in Microsoft Excel.

6.2.3 RESULTS AND DISCUSSION

The flots contained a range of materials that can be associated with human activity and/or natural accumulation within features at the site, Table 1.

Faunal remains included bone, insect (pupae and body parts), and earthworm capsules.

Fungal sclerotia, in this case black spherical specimens ranging in size from 0.5mm to 4mm in diameter, formed of hardened fungal mycelium created by some fungi as a food reserve, were recovered from samples from eleven features.

Date	Pre-Hadrianic						Late 2nd C		3rd Century				4th C	Multi-period features				
Feature	Pit [017]	Ditch [002]	Ditch [033]	Ditch [026]	Ditch [043]	Pit [062]	Ditch [045]	Ditch/ Cremation [150]	Ditch/ Drain [011]	Ditch [080]	Cremation		Ditch [058]	Pit [009]		Ditch [208]		
Context (M24-)	018	003	034	027	054	063	046	149	035	082	103	117	059	010	021	209	210	
Sample (MES2024-)	005	007	012	016	024	026	018	071	013	033	044	053	028	003	006	091	092	Total
Volume processed (l)	20	5	20	35	10	5	10	28	30	40	15	5	20	40	20	5	5	313
Flot weight (g)	1.68	0.13	1.84	2.42	6.19	1.12	2.87	23.83	11.95	7.06	38.53	67.20	1.85	7.53	4.13	7.40	8.68	194.41
Material Flot volume (ml)	20	15	25	60	70	15	45	75	75	100	80	125	25	50	30	150	75	1035
Slag/volcanic stone											*	***						
Burnt bone (?human)								*			*	*						
Insect				*			*	*	*				*	*	*	**	**	
Earthworm capsules	*			*	*			*			*		*	*	*	*	*	
Fungal sclerotia	**	*	**	*	*		**		**					**	*	*	*	
Charcoal >4mm								6		3				3	4			16
Charcoal <4mm		*	**	*	*	**	*	***	**		***	*		***	*	*	*	
Coal	*												*	*	*			
Amorphous organic material																***	***	
Plastic fragments			*				*						*					
Roots	***	***	***	***	***	***	***		***				***	***	***	***	***	
Triticum sp. - indet. wheat						1												1
2-4mm *Gramineae*										1								1
Gramineae (glume)														2				2
Rubus idaeus - raspberry	1																	1
Calluna vulgaris - heather (flower/fruit/seed)					1					64								65
Calluna vulgaris - heather (stem)										11								11
cf. *Erica* sp. - heath										2								2
? *Myrica gale* - bog-myrtle (female catkin)					1													1
Carex cf. *pulicaris* - flea sedge																	1	1
Carex (trigonous) - sedge									1	3								4
Carex (lenticular) - sedge										2								2
Isolepis setacea - bristle club-rush															2			2
Montia fontana - blinks																1		1
Montia sp. - blinks										1								1
Persicaria lapathifolia - pale persicaria													2					2
Persicaria lapathifolia / *Persicaria maculosa* - pale persicaria / redshank										1								1
Persicaria sp. - knotweed										2								2
Polygonum sp. - knotgrass														2				2
cf. *Potentilla* - cinquefoil										6								6
Fallopia convolvulus - black-bindweed									1									1
Rumex acetosella - sheep's sorrel										2								2
Rumex crispus-type - dock										3								3
cf. *Ajuga* sp. - bugle										1								1
Betula - birch (catkin scale)														1				1
Indeterminate										2			1		1		1	5
Total	1	0	0	0	2	1	0	6	2	104	0	0	3	8	7	1	2	137

Table 1: *Summary of environmental and artefactual remains recovered from flots from samples from south of milecastle 46 in 2024, count/abundance. Abundance: ***abundant, ** common, * rare.*

The plant remains included wood charcoal and charred and waterlogged specimens representing a range of domestic and wild taxa indicative of human cultivation and dietary practices as well as environmental conditions at and in the vicinity of the site.

Bioturbation proxies included untransformed (recent) plant roots and earthworm capsules.

Below, the remains recovered are presented by material.

6.2.3.1 SLAG/VOLCANIC STONE

Light-weight material either representing volcanic stone or waste material from high-temperature industry was abundant in the flot from sample MES2024-053, context M24-117, a cremation fill, and rare in the flot from sample MES2024-044, M24-103, another cremation fill. Both features were of 3rd century date. Larger fragments of this material were recovered via hand-collection, and it is thought that this represents the remains of a quern stone, perhaps included in the cremation pyre, some of which was gathered up with the cremated human remains for burial (Birley Andrew R., *pers. comm*.).

6.2.3.2 COAL

Small fragments of coal were observed in four samples, from three features: pit M24-9, pit M24-43 and ditch M24-58 (Table 1). Small fragments of coal were also noted in samples taken during excavations in 2023 (Russ 2024). While coal was mined and used in Britain during the Roman period (e.g. Dearne and Brannigan 1995; Travis 2008), coal occurs naturally in the local area, with the site located close to coal outcrops and workings (Coal Authority 2024). It was not possible to determine if the coal fragments resulted from mining during the Roman period, if they are intrusive and resulted from later activity at the site, or if they are naturally occurring.

6.2.3.3 BONE

Bone was present in three flots, and all the bone was burnt or calcined. All three flots were from samples taken from human cremation burial features; it is likely that the bone represents additional human remains from these features, though none retained any morphological features that might allow identification.

6.2.3.4 INSECTS

Insect remains were present in small numbers in nine samples (Table 1), and were more frequent in two of these, both from ditch M24-208. The insect remains included pupae and body parts; it was not possible to determine if the remains represented recent inclusions in those archaeological deposits, or ancient remains that might contribute to understanding past conditions at Magna. The quantities were not sufficient for any meaningful analyses, but did include identifiable remains should further work be deemed useful for answering research questions. The recovery of insect remains, mainly from ditch features, highlights the potential for insect specific sampling at the site.

6.2.3.5 FUNGAL SCLEROTIA

Fungal sclerotia, in this case black spherical specimens ranging in size from 0.5mm to 4mm in diameter, formed of hardened fungal mycelium and created by some fungi as a food reserve, were recovered from 11 samples. The species of fungus could not be identified, and it is uncertain if their presence is related to fungal activity during the Roman period, or more recently. Fungal sclerotia are common finds in flots recovered from bulk environmental samples, but the nature of their accumulation has yet to be understood.

6.2.3.6 WOOD CHARCOAL

Wood charcoal was present in 15 of the 17 samples (Table 1). Most of the samples that contained charcoal had only small fragments (<4mm) that had very low or no potential for further analysis that might allow wood species identification. Four samples had fragments of charcoal over 4mm that might allow fracture for wood species identification; however, the low count in any single sample/context is limiting for any meaningful analysis. Larger assemblages of wood charcoal were recovered from the heavy fractions from the bulk environmental sample from pyre debris pit M24-83, which contained *c.* 180 fragments in total including roundwood charcoal suitable for radiocarbon dating (Table 2).

Wood charcoal was also recovered via hand-collection on site from 13 contexts from nine features (Table 2). In total, eight were considered to have high potential for analysis work to identify species, five medium potential and seven low potential (Table 2). The level of potential was assessed such that future decisions can be made regarding the selection of material for analysis that can focus on answering research questions around wood use and environmental conditions at the site.

Feature	Context	Sample no.	Sample type	Material	Weight (g)	Count (estimate)	Roundwood?	Potential
Cremation	M24-103	MES2024-044	Charcoal	Charcoal >4mm	16.3	100	y	Medium
Cremation	M24-117	MES2024-053	Charcoal	Charcoal >4mm	8.11	100	n	Low
Cremation	M24-156	MES2024-072	Charcoal	Charcoal >4mm	29.3	200	y	Medium
			Charcoal	Charcoal >4mm	29.22	50	n	Medium
Cremation	M24-157	MES2024-073	Charcoal	Charcoal >4mm	14.87	50	n	Medium
Cremation	M24-158	MES2024-079	Charcoal	Charcoal >4mm	0.17	1	n	Low
Cremation	M24-172	MES2024-082	Charcoal	Charcoal >4mm	5.59	40	n	Low
Ditch [080]	M24-82	MES2024-033	Bulk environmental - flot	Charcoal >4mm	0.18	3	n	Low
Ditch/Cremation [150]	M24-149	MES2024-071	Charcoal	Charcoal >4mm	54.06	150	y	High
			Bulk environmental - flot	Charcoal >4mm	0.57	6	n	Low
	M24-170	MES2024-080	Charcoal	Charcoal >4mm	63.32	200	y	High
	M24-171	MES2024-081	Charcoal	Charcoal >4mm	55.49	100	y	High
Pit / Cremation [083]	M24-84	MES2024-059	Bulk environmental - heavy fraction	Charcoal >4mm	55.95	30	y	High
			Bulk environmental - heavy fraction	Charcoal >4mm	134.81	150	y	High
	M24-84 East		Charcoal	Charcoal >4mm	115.25	150	y	High
	M24-84 West	MES2024-056	Charcoal	Charcoal >4mm	29	50	y	High
	M24-96	MES2024-041	Charcoal	Charcoal >4mm	131.52	500	y	High
Pit / Cremation [098]	M24-99	MES2024-043	Charcoal	Charcoal >4mm	110.08	500	y	Medium
Pit [009]	M24-010	MES2024-003	Bulk environmental - flot	Charcoal >4mm	0.24	3	n	Low
	M24-021	MES2024-006	Bulk environmental - flot	Charcoal >4mm	0.32	4	n	Low

***Table 2:** Summary of charcoal recovered by hand on site, and from heavy and light fractions (flots) of bulk environmental samples indicating potential for further analysis.*

6.2.3.7 PLANT REMAINS

Charred and waterlogged plant remains were identified, quantified and displayed in Tables 1 and 3.

Charred

Charred plant remains are likely to represent plants that were being utilised or impacted by people at Magna as it is unlikely that naturally charred plant remains would enter the archaeological record. Plant remains become charred through a range of different processes; these include accidents during drying and/or cooking, the clearance of land by fire, discard of food waste in hearths or kilns, and the destruction/discard of spoiled food by burning. The seeds of weeds can become charred when harvested alongside cultivated crops and subsequently included in the drying process.

Charred plant remains (excluding wood charcoal, see Chapter 6.2.3.6) were present in eight of the 17 flots, from seven features dating between the pre-Hadrianic period and the 4th century CE (Table 3). Charred plant remains were recovered in small numbers, with only ditch M24-80 containing more than two specimens in total.

Charred remains of cultivated plants included a single wheat grain (*Triticum* sp.) from pre-Hadrianic pit M24-62 that could not be identified to type. A charred raspberry seed (n=1; *Rubus idaeus*; 'seed' used here to mean fruitlet (endocarp) was recovered from pre-Hadrianic pit M24-17 and likely represents a wild specimen, as it is thought that raspberry cultivation came later in the Roman period in Britain.

Charred remains of other plants include those that might represent weeds that potentially grew alongside cultivated crops, and/or wild plants burned during clearance or accidentally burned during other activities. These included various sedges (*Carex* cf. *pulicaris* (flea sedge) and *Carex* (trigonous)), docks (*Rumex* cf. *acetosella* (sheep's sorrel) and *Rumex* crispus-type)), black bindweed (*Fallopia convolvulus*), knotweed (*Persicaria genus*), knotgrass (*Polygonum genus*), blinks (*Montia fontana* and *Montia* sp.), as well as possible cinquefoils (cf. *Potentilla* spp.) and bugle (cf. *Ajuga* sp.). Every effort was made to determine the preservation form for the *Polygonaceae* taxa (i.e. *Persicaria* and *Polygonum genera*), but this was occasionally difficult to establish, and some *Polygonaceae* specimens recorded as charred, waterlogged and recent may have been preserved by other means.

The main finding of note for the 2024 samples was the assemblage of charred heather (*Calluna vulgaris*) remains from ditch M24-80. This material included flowers, fruits, seeds, and stems, indicative of heather burning. Heather was collected as fuel, but also used in thatch, and rope and broom production. These remains may indicate the use of heather as a fuel in this area, whether as its primary role, or after a primary use as a raw material in roofing or artefacts. Alternatively, if used in thatch the remains

Date	Pre-Hadrianic				3rd Century			4th C		Multi-period features				
Feature	Pit [017]	Ditch [043]		Pit [062]	Ditch/Drain [011]	Ditch [080]		Ditch [058]		Pit [009]			Ditch [208]		
Context (M24-)	018	054		063	035	082		059		010		021	209	210	
Sample (MES2024-)	005	024		026	013	033		028		003		006	091	092	Total
Volume processed (l)	20	10		5	30	40		20		40		20	5	5	195
Flot weight (g)	1.68	6.19		1.12	11.95	7.06		1.85		7.53		4.13	7.40	8.68	57.59
Flot volume (l)	20	70		15	75	100		25		50		30	150	75	610
Taxon Preservation	ch	ch	wl	ch	ch	ch	wl	ch	wl	r	wl	wl	ch	ch	
Triticum sp. - indet. wheat				1											1
2-4mm *Gramineae*						1									1
Gramineae (glume)										2					2
Rubus idaeus - raspberry	1														1
Calluna vulgaris - heather (flower/fruit/seed)		1				64									65
Calluna vulgaris - heather (stem)						11									11
cf. *Erica* sp. - heath						2									2
? *Myrica gale* - bog-myrtle (female catkin)			1												1
Carex cf. *pulicaris* - flea sedge														1	1
Carex (trigonous) - sedge					1	3									4
Carex (lenticular) - sedge							2								2
Isolepis setacea - bristle club-rush												2			2
Montia fontana - blinks															1
Montia sp. - blinks						1							1		1
Persicaria lapathifolia - pale persicaria									2						2
Persicaria lapathifolia / *Persicaria maculosa* - pale persicaria / redshank						1									1
Persicaria sp. - knotweed							2								2
Polygonum sp. - knotgrass											2?				2
cf. *Potentilla* - cinquefoil						6									6
Fallopia convolvulus - black-bindweed					1										1
Rumex acetosella - sheep's sorrel						2									2
Rumex crispus-type - dock						3									3
cf. *Ajuga* sp. - bugle						1									1
Betula - birch (catkin scale)										1					1
Indeterminate						2		1				1		1	5
Total	1	1	1	1	2	97	4	1	2	3	2?	3	1	2	121

Table 3: *Plant remains from flots from bulk environmental samples taken south of milecastle 46 in 2024 (M24), count. Preservation: ch=charred, wl=waterlogged, r=recent.*

could represent those resulting from burnt thatched structures, which could be related to accidental fire or the clearance of old structures in areas needed for new structures. The presence of the fruits suggests harvest in the late summer as was also noted for heather remains from Carlisle (Huckerby and Graham 2009: 929). Other plant remains from this context also reflect heath environments and could have been incidentally collected alongside the heather, for example, the possible cinquefoil and heath as well as wetland species including blinks and sedges. Another possibility is that these remains were incorporated and preserved within peat that was exploited as fuel, first preserved by waterlogging and subsequently carbonised.

Waterlogged

Plant remains are preserved by waterlogging because of the absence of oxygen. None of the samples included in this reporting were taken from deposits that were considered waterlogged during excavation; however, five samples had a small number of potentially waterlogged remains (Table 3). Pit M24-9 had two bristle club-rush (*Isolepis setacea*) fruits as well as an unidentified seed from context M24-21 and potentially two waterlogged knotgrass fruits (*Polygonum* sp.) from M24-10. Ditch M24-58 had two pale persicaria fruits (*Persicaria lapathifolia*), ditch M24-80 had two sedges of lenticular form *Carex* sp. and two knotweed (*Persicaria* sp.) fruits, and ditch M24-43 a specimen thought to represent a female catkin of bog-myrtle (? *Myrica gale*).

6.2.3.8 BIOTURBATION PROXIES

Bioturbation proxies included untransformed (i.e. recent) roots, earthworm capsules and potentially insect remains (see Chapter 6.2.3.4).

Roots

Untransformed (i.e. recent) roots were present in 13 flots and recorded as abundant (***) in all 13 (Table 1). As plant roots grow through archaeological features, they can disturb archaeological remains, especially smaller items such as those recovered via flotation. As such, it is important to note that deposits with high concentrations of roots may contain intrusive and/or residual material that has been translocated by root action.

Earthworm Capsules

Earthworm capsules were recorded as rare (*) in ten flots from eight features, pits M24-9 and M24-17, ditches M24-26, M24-43, M24-58, and M24-208, and two cremation features (Table 1). As is the case for rooting (see above), the action of earthworms can lead to the translocation of specimens within the archaeological record and as such, their presence is an indication of the potential for intrusive and/or residual specimens within that context.

6.2.4 CONCLUSION

The remains recovered from bulk environmental samples have provided additional insights into human diet and economy as well as offering information for understanding past environmental conditions at Magna. In combination with those recovered during excavations in 2023 (Russ 2024, Chapter 6.1 this volume) and those that will be recovered during future excavations, the remains are hoped to provide a detailed understanding of the roles that plants played in the day to day lives of those living in and around Magna and those visiting the site; however, the samples considered from excavations in 2023 and 2024 have not yielded sufficient material to undertake any statistical or more detailed analyses.

The small fragments of coal recovered from the flots do not add any information that contributes to understanding human activity around milecastle 46 during the Roman period.

The bone recovered almost certainly represents small fragments of human remains as they were all burnt and present in samples from cremation burial features. None were identifiable further than 'burnt mammal bone'.

The hand-collected charcoal samples have the potential to inform on past wood and fuel use; the charcoal recovered from the heavy fraction and light fractions of the samples were too small and poorly preserved for inclusion in any detailed identification or analysis work. Questions regarding the composition of local woodland, wood use and fuel choices could be addressed through the identification and analysis of wood charcoal from the site. A brief assessment of species undertaken in 2024 on charcoal recovered during excavations in 2023 (Russ 2024) indicated the use of at least six species of wood, all of which were noted at other sites along Hadrian's Wall. On completion of the current series of excavations a research plan for the charcoal should be agreed such that identification and analysis can focus on answering identified research questions using the most appropriate remains from each year of excavation.

The plant remains are consistent with those expected at a Roman period site in northern England (e.g. Huntley and Stallibrass 1995: 42-59) but were recovered only in very small quantities. The only evidence for cultivated plants was a single wheat grain from pre-Hadrianic pit M24-62, and the only other potential food plant was a raspberry fruitlet (endocarp) from pre-Hadrianic pit M24-17. There was no evidence for any of the many plant species introduced to Britain during the Roman period (e.g. van der Veen 2008).

Heather remains are frequently present in the archaeobotanical assemblages recovered from Roman period sites, including Carlisle (Huckerby and Graham 2009: 929) and Birdoswald (Huntley 1991; also see Huntley and Stallibrass 1995: 57). As discussed above, there are many uses for heather and means by which it could become carbonised

and incorporated within archaeological deposits. Heather would have been a widely available resource within the vicinity of milecastle 46, and a likely component within peat, which was also a locally available resource (Natural England 2010) and an important fuel material during the Roman period.

Overall, the charred and waterlogged plant remains form a very small assemblage that is not sufficient for any further analysis at this time; this may change depending on the material recovered during future years of excavations that are planned at the site. Once this series of excavations have been completed, a more exhaustive review of the findings with comparisons to published assemblages (see Huntley and Stallibrass 1995 and Huntley 2010, and references within), especially those for other Hadrian's Wall sites, should be undertaken to place the plant remains from Magna fully within their chronological and geographical context.

6.2.5 RECOMMENDATIONS

The remains recovered from the flots studied in this analysis should be retained within the site archive. This report and associated data should be retained within the site archive and integrated into any sitewide grey literature or publication reporting.

Once this series of excavations have been completed, a more exhaustive consideration of the plant remains with comparisons to published assemblages, especially those for other Hadrian's Wall sites should be undertaken to place the plant remains from Magna fully within their chronological and geographical context. The results presented here should be integrated with those from 2023 (see Russ 2024, Chapter 6.1 this volume) and additional future excavations undertaken at the site to produce a single final report.

As discussed above, on completion of the current series of excavations a research plan for the charcoal should be agreed such that identification and analysis can focus on answering identified research questions using the most appropriate remains from each year of excavation.

6.2.6 ACKNOWLEDGEMENTS

Jacqui Huntley provided excellent support and advice as well as checking species identifications; huge thanks to her for her time, expertise, and patience.

I would like to thank Dr Andrew Birley, The Vindolanda Trust and the Magna 2024 excavation team and volunteers, and Franki Gillis, Geoarchaeologist, The Vindolanda Trust, for all her help with information about the samples and the site.

7. ELEMENTAL ANALYSIS OF SOIL

FRANKI GILLIS & DR GILLIAN TAYLOR

Over 450 geochemical samples were taken during the 2024 excavation season. Together with geochemical samples from the 2023 excavation season this forms a comprehensive geochemical survey of Area A at Magna. The geochemical soil samples were processed and analysed with a portable X-Ray Fluorescence (pXRF) machine under the supervision of Dr Gillian Taylor, Associate Professor at Teesside University, and with the assistance of Dr Rhys Williams, Assistant Professor at Loyola University Maryland, and Luke Parker, geoarchaeologist for York Archaeology.

***Figure 1:** Samples being taken in the* vallum *during March 2024.*

Sampling of the topsoil layer commenced in March 2024, prior to the area being machine stripped for the excavation season. An approximate 2x2m grid of the Area A southern trench was created using measuring tapes and flags. Then each sample location was recorded using the total station (Figs. 1 and 2).

***Figure 2:** Recording the samples using the total station.*

The same approximate 2x2m grid was used to sample the subsoil as excavation was underway. This methodological plan allowed for topsoil samples and subsoil samples to have similar coordinates, enabling direct comparisons. Overall, an approximate area of 1150 square metres of topsoil and subsoil were sampled.

Following collection, samples were taken to Teesside University to be prepared for processing. Although, the pXRF can record results in the field, laboratory preparation is essential for optimum results (Williams *et al*. 2020: 1146). Soil samples were oven dried at 105°C for 24 hours to remove moisture – moisture is one of the primary interfering factors for accurate results. Sample were then ground using a pestle and mortar before being put

through a 2mm sieve. Next, they were placed into sample cups and sealed with polypropylene film, scanned by the pXRF instrument, and the elemental results were automatically recorded.

Soil contains a mixture of elements, including iron (Fe), silica (Si), phosphorus (P), potassium (K), and aluminium (Al) as major elements, and minor elements such as calcium (Ca), chlorine (Cl), manganese (Mn), and magnesium (Mg). The pXRF instrument can measure these elements and thus provide discrimination between samples. For example, iron and phosphorus are good indicators of human activity on archaeological sites, and their varied concentration in the subsoil demonstrates different hubs of activity around the milecastle. Iron is generally the result of fire, butchery, or leeching from artefacts, while phosphorus is generally the result of anthropogenic refuse or an indication of a burial ground (Williams *et al*. 2021: 104; Holliday and Gartner 2007: 302).

Iron is always present in soil samples, however, variation between topsoil and subsoil concentrations can differ. Fig. 3 indicates the variable composition of the topsoil versus the subsoil, using the 2023 geochemical data from the milecastle area. For iron concentrations in topsoil, the maximum and minimum range of the element is comparatively small, which establishes a limited use of topsoil for geochemical analysis without further archaeological excavation. However, iron concentration in subsoil has a wide range (0.32% to 13.4%) which is much more informative about practices that may have occurred, including indicating occupational activity.

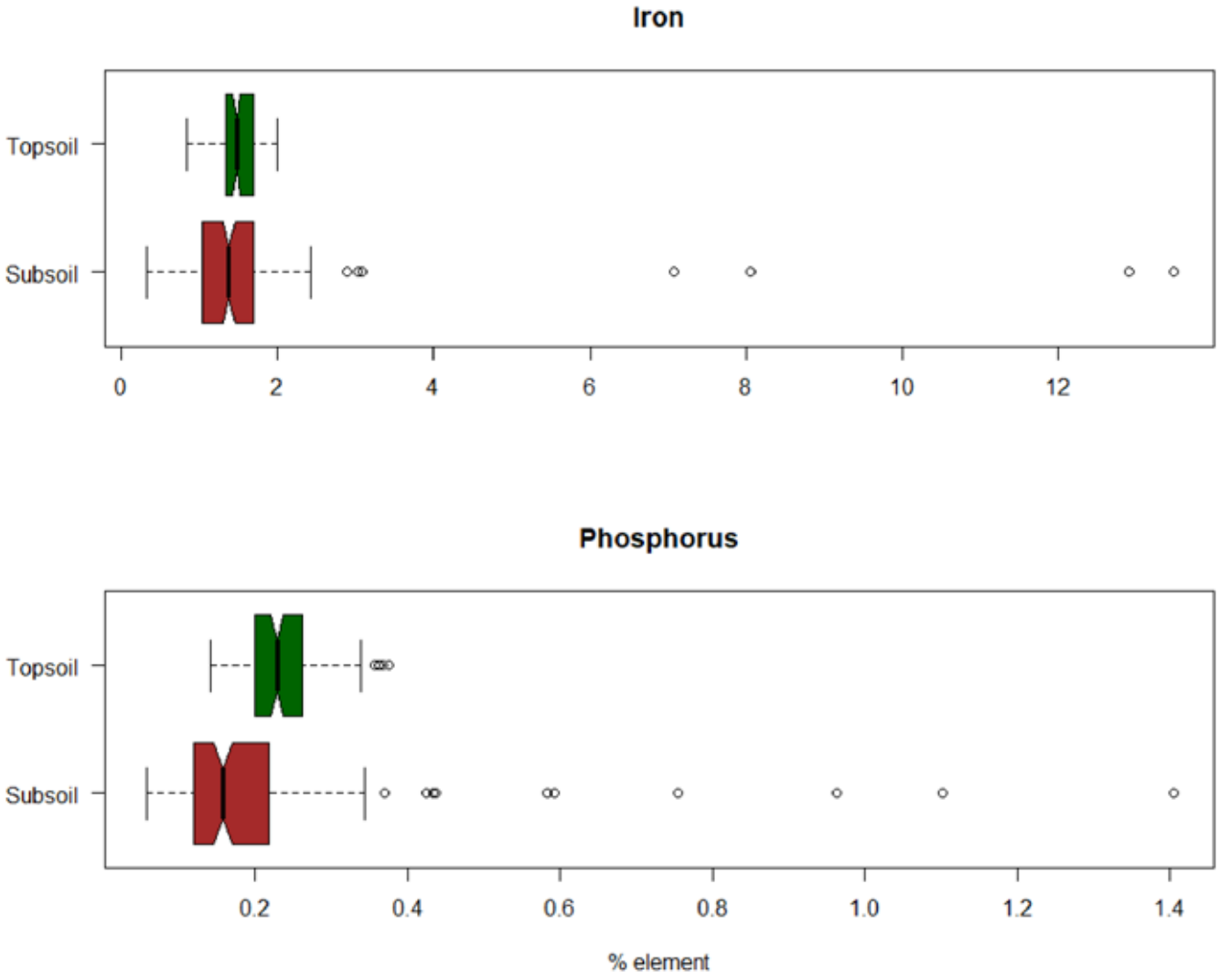


Figure 3: *Boxplot which shows the range of iron and phosphorus in samples across the milecastle in Area A, comparing the topsoil and subsoil.*

7.1 TOPSOIL

Preliminary interpretation of the topsoil results within Area A indicate a significant increase of iron and phosphorus concentrations within the milecastle interior space (Fig. 4, the dark red indicates high concentration). The high concentration of both elements indicates increased anthropogenic activity within this structure and correlates with the archaeological findings in the area, such as the drain M23-96 along the central road within the milecastle and the three metal artefacts found on the interior face of the southern milecastle wall (MSF4, MSF5, MSF14). Across the excavation site, there is a slight increase in iron concentration near the *vallum*, but the modern drainage interference makes that difficult to interpret. Phosphorus is easier to interpret across the site; just like in the milecastle interior, there is an increased concentration near the Roman drain M24-22 south of the milecastle. These concentrations near drains are likely due to the accumulation of human refuse during the drain's usage. Moreover, there is increased phosphorus content near the area surrounding the cremation cluster (see Chapters 2.6.2 and 5) north of the *vallum*. This is to be expected on account of the five cremation features in that area. However, full interpretation of the relationship between the phosphorus content and the burial ground cannot be completed until all samples from the 2024 excavation season are processed.

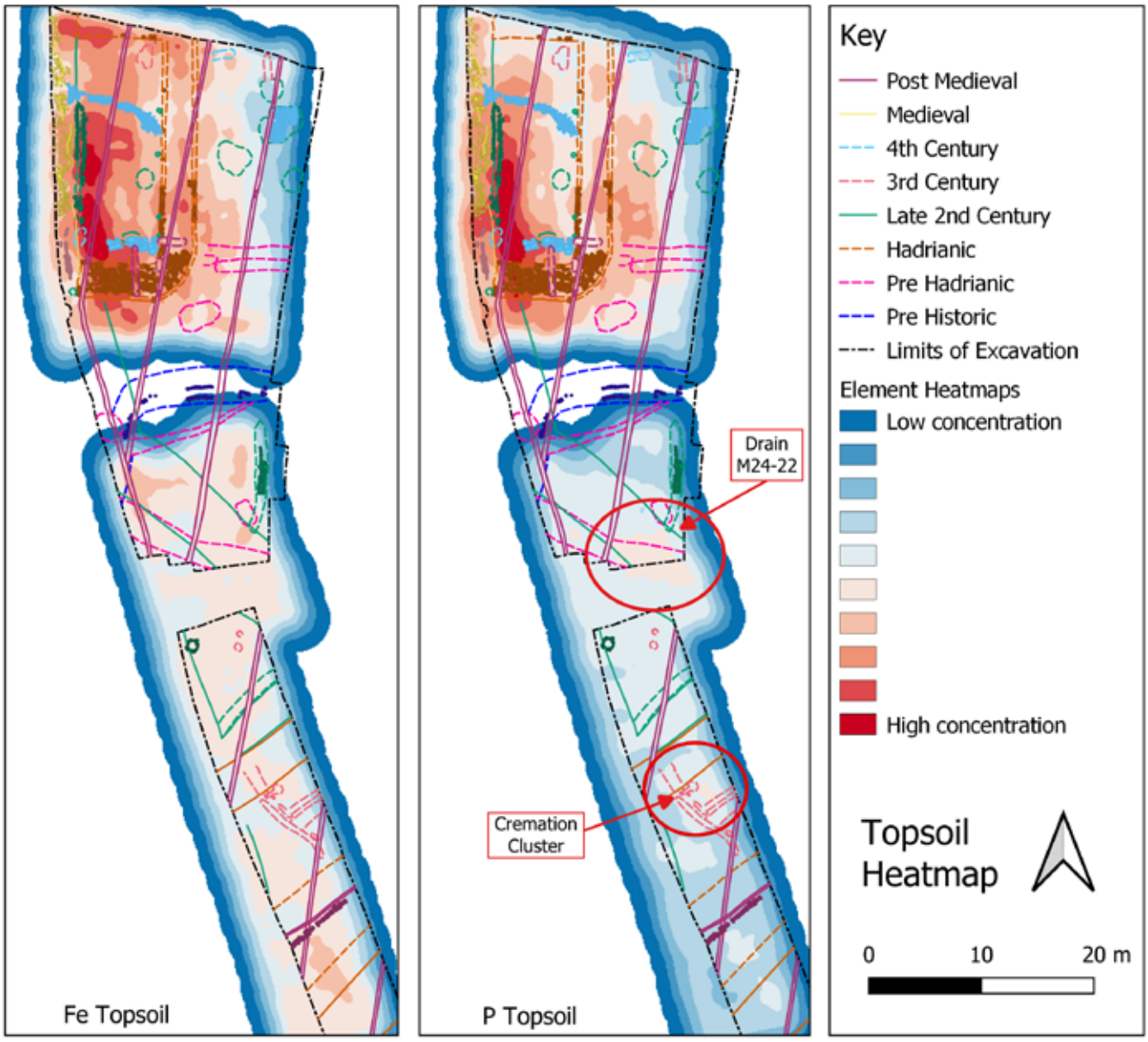


Figure 4: *Heatmap showing iron (left) and phosphorus (right) concentrations in the topsoil across half of Area A.*

7.2 SUBSOIL

The highest concentrations of iron and phosphorus were in areas with high occupational evidence. Figures 5 and 6 show these increased concentrations near the industrial pits to the east of the milecastle and the pre-Hadrianic ditch at the southeast corner of the milecastle wall. In addition to the clear archaeological evidence of human activity, the iron results were likely impacted by the significant amounts of ironstone and ironstone fragments recovered in these areas. The numerous iron-rich rocks are not surprising given that the underlying bedrock is mafic Whin Sill dolerite.

While there was a slightly increased concentration of phosphorus near the inhumation, it was not the high levels one might expect from a burial. It is difficult to determine why that may be the case, since there are a variety of factors which might affect phosphorus' interactions within a soil environment (see Holliday and Gartner 2007 for an overview of phosphorus in archaeological soils). For instance, the phosphorus could have been mobilised due to exposure to weather and microorganisms. As the remaining geochemical samples finish processing, it will be intriguing to see the patterns that appear across the entirety of Area A, in both the topsoil and subsoil.

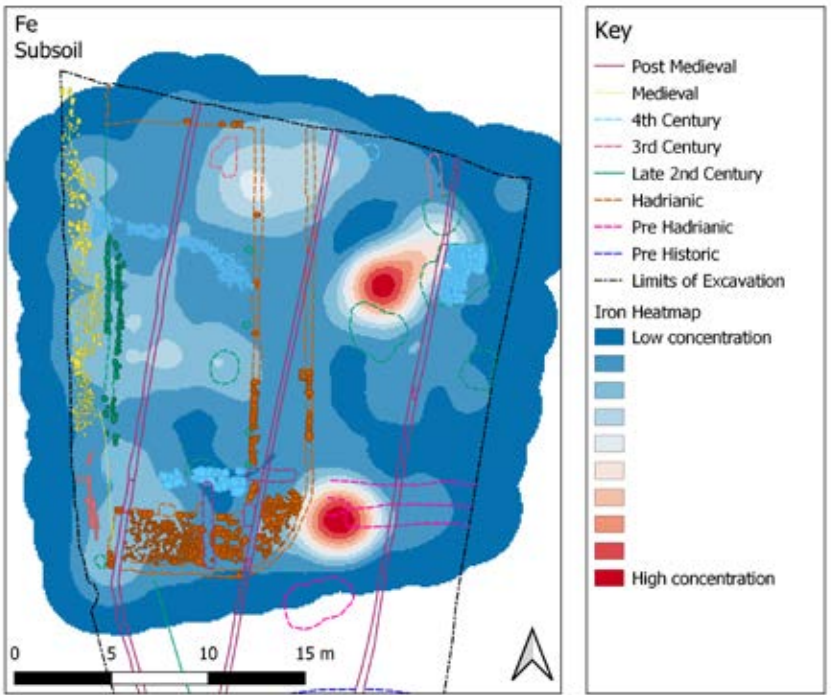


***Figure 5:** Heatmap of iron concentration in the subsoil of the milecastle.*

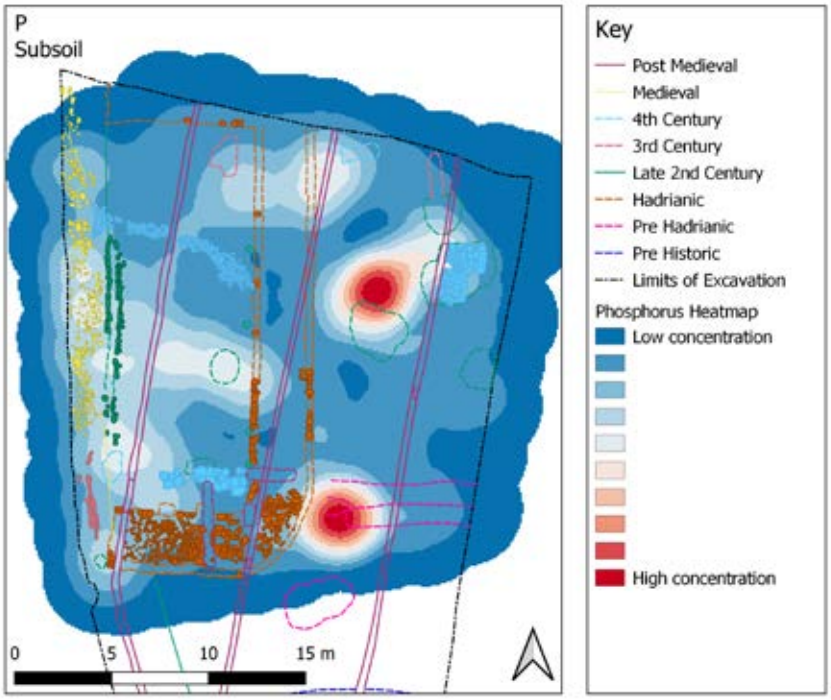


***Figure 6:** Heatmap of phosphorus concentration in the subsoil of the milecastle.*

8. POLLEN ANALYSIS 2024

DR ROBERT D. MCCULLOCH & FRANKI GILLIS

8.1 INTRODUCTION

The archaeological evidence for the Roman military presence in Scotland and northern England is considerable. However, environmental evidence for the effects of the Roman presence on the wider landscape, native settlements and economies is scarce, despite the Roman occupation of the Hadrianic frontier zone enduring for around 300 years. The analysis of fossil pollen remains the most successful technique to reconstruct past landscape change (Tipping 1994). No other technique provides the key elements of being able to synthesize patterns of vegetation in space and time. The small size of pollen (typically between 10 µm and 60 µm), its near ubiquitous presence in the landscape, its tough resistance to deterioration, and its preservation in waterlogged or anaerobic deposits, such as peat and lake muds, make it a useful microfossil for the reconstruction of landscape change, and human impacts on the landscape. It also offers the potential to support inferences regarding climatic changes, although disentangling human and climate signals can be problematic. This report presents preliminary evidence from waterlogged organic rich sediments excavated during 2024 from a ditch fill close to the *vallum* at the fort of Magna (Fig. 1a and 1b).

8.2 METHODS

Sub-samples (1cm^3) were taken from a stratigraphical profile 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 ~25 min 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 180 µm and 10 µm sieve mesh. Sample material retained on the 10 µm 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 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

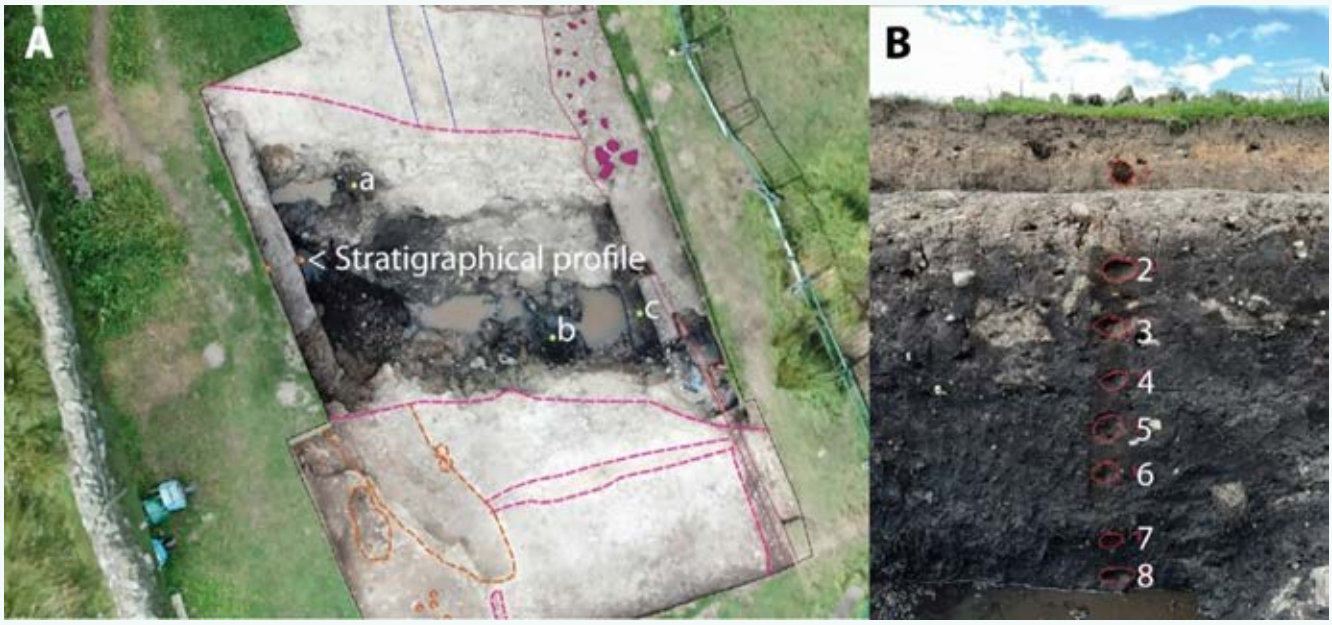


Figure 1: *A) an aerial view of the 2024 ditch excavation and the location of the stratigraphical profile sampled for pollen analysis. Three additional samples (a, b, and c) will be analysed for pollen content. B) The stratigraphical profile and the seven sample points analysed for fossil pollen.*

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 cm^3) were estimated by adding a known quantity of *Lycopodium clavatum* to each sample obtained from the University of Lund (Stockmarr 1971). Charcoal particles between 10 µm and 180 µm 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. 2). 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).

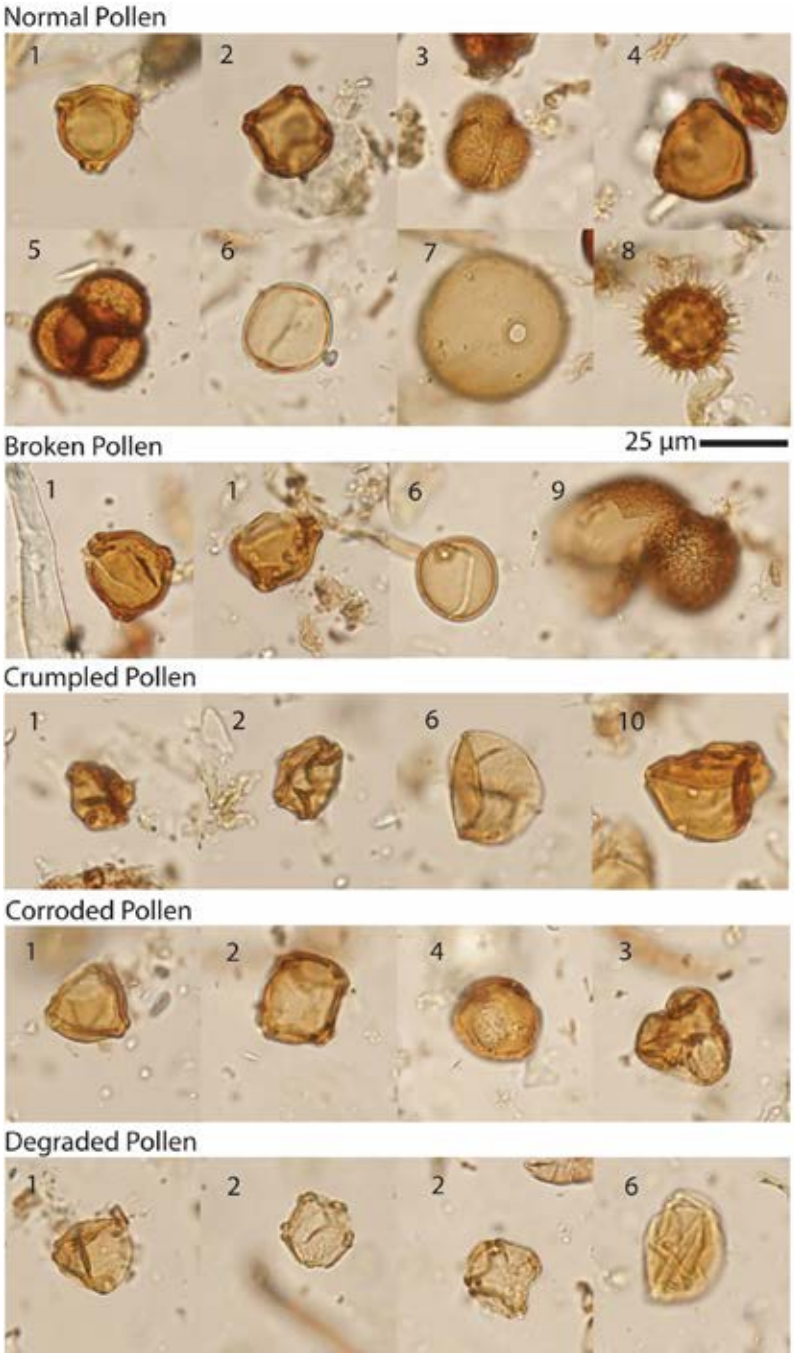


Figure 2: Examples of pollen and states of preservation from the Magna pollen profile: 1 Betula (birch), 2 Alnus (alder), 3 Quercus (oak), 4 Corylus avellana type (hazel/bog-myrtle), 5 Calluna vulgaris (ling, common heather), 6 Poaceae (grasses), 7 Hordeum type (barley), 8 Asteraceae sub fam. Asteroideae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

8.3 RESULTS

The pollen samples from the ditch profile are believed to be Roman in date based on the contexts from which they were taken (Table 1). Samples 3 and 4 have been dated to the 2nd century but ceramic evidence from this context (M24-132) suggests that the sediment accumulated over an extended period of time from the 2nd century into the late 3rd or early 4th century CE.

Sample profile (P) No.	Context Date
P2 (53cm)	4th century CE
P3 (68cm)	Late 2nd century CE
P4 (83cm)	2nd century CE
P5 (98 cm)	Pre-Hadrianic (late 1st century CE)
P6 (113cm)	Pre-Hadrianic (late 1st century CE)
P7 (128cm)	Pre-Hadrianic (late 1st century CE)
P8 (143cm)	Pre-Hadrianic (late 1st century CE)

Table 1: *Pollen samples and suggested ages for their context.*

All the samples contained high concentrations of pollen ranging from P7 ~280,100 grains cm^3 to P2 ~1,248,000 grains cm^3 (Median value ~613,000 grains cm^3). Overall, the pollen in each sample are well-preserved with the proportions of normal pollen being greater than 50% of TLP while broken and crumpled pollen grains (i.e. mechanical damage) being ~20% of TLP combined, which reflects the wet boggy conditions at the site (Fig. 3). However, there is a gradual increase in the proportions of corroded and degraded pollen (from ~10% to ~30% of TLP combined) at shallower depths which suggests a gradual shift, perhaps episodic, to drier conditions.

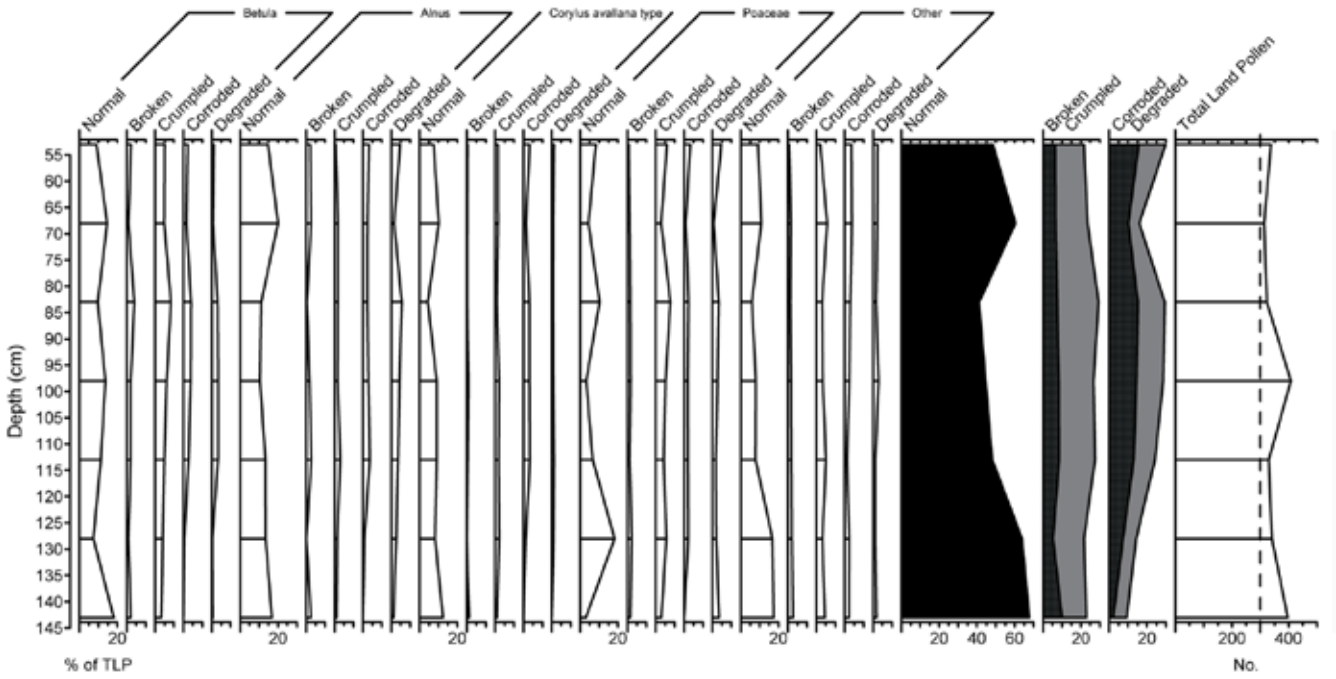


Figure 3: *Percentage pollen preservation diagram for selected major and all other land pollen taxa.*

The percentage pollen assemblages indicate the persistence of a boggy area dominated by an alder carr and surrounded by mixed woodland of birch and oak, and hazel shrub (Fig. 4). The picture painted by the pollen record is one of stability and little activity nearby. There were two brief intervals of cereal production or processing nearby. Cereal pollen tends not to travel far from its source due to its relatively large size. The first, particularly significant, interval occurred during the pre-Hadrianic period (P7) which also included indicators of grazing: *Rumex acetosella* (sheep's sorrel) and *Rumex acetosa* (common sorrel and docks). The second smaller interval of cereal production occurred in the 4th century CE at the end of the organic rich profile (P2). This period also includes some indicators of grazing such as *Plantago lanceolata* (ribwort plantain) and *Rumex acetosella* (sheep's sorrel). Barley pollen is absent in samples P6 to P3.

There is no indication of the selective removal of trees, and it seems that the woodland, absent today, was allowed to persist. This contrasts with the large extent of woodland clearance before and during the Roman occupation seen elsewhere (Manning *et al*. 1997; Dumayne-Peaty and Barber 1998; McCulloch *et al*. 2021). The picture of a brief period of occupation/activity with little overall change to the pre-existing landscape agrees with the archaeological interpretation of the area. The ditch has been interpreted as a military ditch for a potential annexe attached to an earlier iteration of Magna fort, pre-dating the construction of Hadrian's Wall (see Chapter 2.3.4). This may well have been a short-lived structure, for which it was not worth clearing the surrounding woodland.

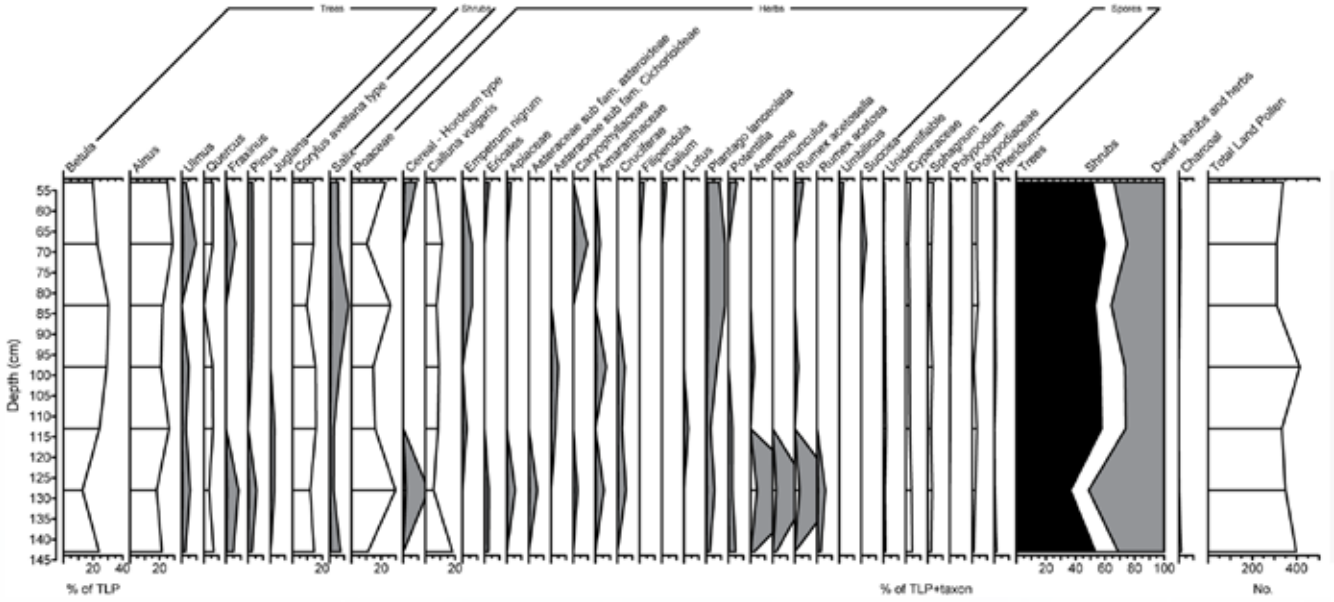


Figure 4: *Percentage pollen and spore diagram. Grey shading for individual taxa indicates x10 exaggeration.*

9. MICROMORPHOLOGY SAMPLING OF THE *VALLUM*

DR TANJA ROMANKIEWICZ & DR GILLIAN TAYLOR

9.1 GENERAL

The 2024 work at Magna included sampling for geoarchaeological analysis of the *vallum* at the site. The *vallum* typically consists of a ditch *c.* 6 m wide, with two mounds on either side. These features are placed to the north and south of the ditch running east-west. A lower upcast mound, referred to as the marginal mound, is often identified on the southern berm, in front of the northern side of the south mound. This feature has been described as of different character to the make-up of the north and south mounds. The latter two contain a core of soil, likely derived from the cutting of the ditch, which is revetted by turf or sometimes clay cheeks, or occasionally faced with stones (Breeze 2015: 4). This make-up demonstrates some care in construction and concern for stability. The marginal mound contains looser material, and no revetments have been identified (Breeze 2015: 13). It seems likely that its material generally derived from re-excavated ditch-fill, when the ditch was cleared out in a secondary phase. The original ground surface often survives underneath all mounds as a dark band of decayed vegetation and topsoil (compare with Breeze 2015 for evidence at various other sites).

Evidence for a road make-up has been observed at some sites, interpreted as a Military Way connecting forts and milecastles behind the Wall itself. However, the road is often seen as a later addition, if Roman at all (Breeze 2015: 16). At Magna, the badly degraded remains of the Military Way were identified to the north of the north mound; as such, no evidence for metalling was identified in the sections under analysis here.

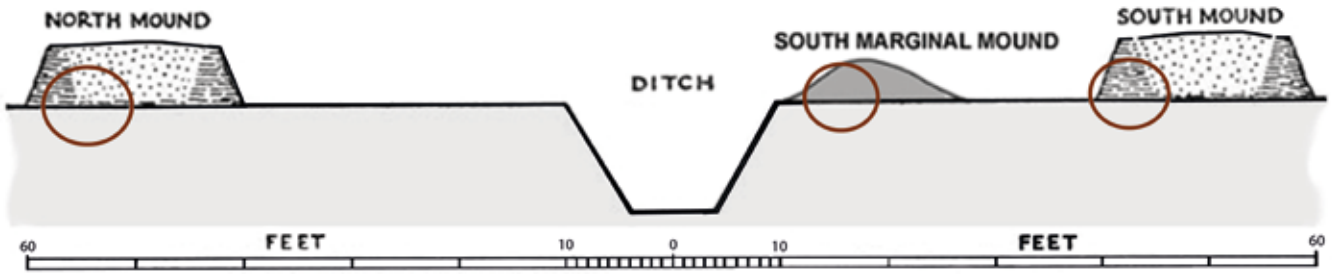


Figure 1: *Schematic section through the* vallum *at Magna. Red circles mark approximate positions of geoarchaeological sampling in 2024. Drawing: T Romankiewicz, after Breeze 2019: 81, Fig. 63.*

9.2 RESEARCH OBJECTIVES

The overall aims of the geoarchaeological analysis at Magna are to characterise the material relating to earthen architectural features as well as to assess their current conditions and preservation for the future. The geoarchaeological analysis can usually also distinguish between admixed materials of looser consistency and articulated turf blocks. If the blocks still contain their former vegetation on top (so-called O horizon), its type, and by inference, the character of the land this grew on can be described. While the turf blocks inform about their source location, the conditions on site can be inferred from the original ground surface, if this survives underneath the mounds. Evidence for grazing can be identified in the soils via disturbed microfeatures and residues from animal dung. Since the turf blocks and the old ground surface also often contain a lower layer of roots and topsoil (referred to as A horizon), and the excavated sections at Magna reached down to the natural subsoil, soil formation processes can also be studied. It might even be possible to determine whether the land was generally dry or boggy. Given that grasslands take time to establish, and the topsoil will have formed prior to the Roman arrival, the geoarchaeological analysis can inform not only on the Roman impact on the land, but also on the land uses in the preceding Iron Age or Bronze Age periods.

For the specific sampling of the *vallum* area in 2024, the work focused on understanding the make-up of the south and north mound, and the composition of the south marginal mound. Were the mounds constructed as generally assumed and could different phases be identified between their constructions? Insights might also be gained on construction processes and which type of landscapes were exploited for the turf parts. In comparison with each other, material compositions may indicate whether the north and south mounds were contemporary with the excavation of the ditch and how the building of the south marginal mound might fit into that sequence. Geoarchaeological results may also help to understand the skills and efforts involved in the construction and to indicate the structural soundness of the mounds and hence the importance of the individual features.

9.3 METHODOLOGY

Three different geoarchaeological sample locations were chosen from the two section edges in the trench cutting across the *vallum* (Fig. 1). Nine micromorphology samples were taken using standard aluminium Kubiena tins or amorphous sample blocks wrapped in cling film where the material was solid enough thanks to an apparently higher clay and lower moisture content. Standard labelling and recording codes were used, in combination with photographic documentation. The archive has been forwarded to the Vindolanda Trust. The micromorphology samples will be processed and analysed at the University of Edinburgh. This includes resinating the soil blocks from which soil thin section slides will be cut and ground until they are translucent and can be studied under a microscope.

In addition, a series of grab samples (*c.* 200ml) were taken in small clear plastic bags, across those same profiles sampled for micromorphology. Every major change in the sediment make-up with regards to colour or texture was sampled separately as discernible by eye in the field. These matched the micromorphology samples' content (for concordances see tables below).

A first batch of geochemical samples were analysed by Dr Gillian Taylor at Teesside University, using a laboratory-based, portable X-Ray fluorescence instrumentation (pXRF) and homogenised subsamples. This followed the protocols of the geochemical survey of Area A (see Chapter 7). The method has proven essential for optimum results from archaeological soils (Williams *et al*. 2020: 1156, 1159). Key elements analysed for the Magna samples are aluminium (Al), calcium (Ca), iron (Fe), potassium (K), phosphorus (P) and silicon (Si). In soils, these elements usually appear as compounds in the form of aluminium (III) oxide (Al_2O_3), calcium oxide (CaO), iron (III) oxide (Fe_2O_3), potassium oxide (K_2O), phosphorus pentoxate (P_2O_5) and silicon dioxide or silica (SiO_2).

The micromorphology and geochemical samples represent vertical profiles through the sections at particular points; however, the uppermost, modern vegetation layers (O horizons) were not sampled in the micromorphology sets. The uppermost layers in the micromorphology samples equate to the lowest levels of the modern topsoil (A horizons). For control, modern O and A horizons were sampled for geochemical analysis.

9.4 SAMPLING CONDITIONS

The samples were taken over two days, the afternoon of Friday 28 June 2024 and all-day Saturday 29 June 2024. The weather was fair with sunny intervals. Some sheep had entered the trench overnight and may have contaminated some material along the sections; however, the geochemical data did not identify any particular spikes.

Although sample conditions were good, it proved difficult to distinguish the northern edge of the south mound from the southern end of the south marginal mound. Turf blocks with an orange hue had seemingly collapsed northwards from the south mound, while a similar coloured material from the marginal mound spread southwards from the ditch. A clear boundary could not easily be drawn, however, slight differences in colour and thickness of the old ground surface onto which both mounds had been built helped to disentangle their approximate positions (Fig. 11). Further geoarchaeological analysis may help to disentangle the two structures and although not all contexts could be subsampled in the field due to these visibility issues, additional subsamples can be taken from the micromorphology samples prior to their resination.

9.5 SAMPLE LOCATION ONE: NORTH MOUND

Three stacked samples were taken from the north mound profile towards its northern edge (Figs. 2, 3 and 4). A thick band of grey/white, clay-rich material was observed, stretching northwards for *c.* 1m (Fig. 2; lower layer in light circle). This was lying on top of a darker surface and was overlain by a more reddish and yellow material, also clay-rich. To its south, a later disturbance of brown, humic soil cut

through the surviving mound, but mound material seems to have continued beyond the later cut, for about 0.75m, before ending in a sharp vertical edge (Fig. 2; white arrow). This edge also appears truncated. The sampling therefore concentrated on the better-preserved northern part. The full extent of the north mound is unclear; however, the excavators agree that it is unlikely that much of the mound's extent had been lost. Since the area to its south contained a number of 3rd century features, including cremation burials (see Chapter 2.2.2), some disturbance of mound material here may stem from this later activity, but removal of large parts of the mound simply for burials and drains seems impractical.

Figure 2: *North mound section prior to sampling, looking east. Light circle indicates location of samples M24-73<MM01-03>; dark circle indicates location of sample M24-73<MM09>. White arrow marks vertically truncated edge to south. Photograph: T Romankiewicz.*

Individual red/yellow and grey/white turf blocks can be made out across the entire width of the low mound. While the white clay material is more amorphous, and it is therefore more difficult to define individual blocks, lozenge-shaped blocks of red and yellow soils can be identified in the core (Fig. 5). The dark material at the bottom seems to represent the original ground surface. The dark line indicates the survival of the original, vegetated surface (Figs. 3 and 4).

Figures 3 and 4: *Sample locations M24-73<MM01-03>, during and after sampling.*

Figure 5: *Line of the original, vegetated surface (white margins) and outline of wall pattern using lozenge-shaped turf-blocks (black). Photograph: T Romankiewicz.*

Sampling targeted the most intact turf blocks. The likely cheek blocks were sampled in M24-73<MM02>, while the red and yellow core blocks were sampled in M24-73<MM01> and <03> (Fig. 3). M24-73<MM01> also contained the decayed vegetation on top of the old ground surface and cut into the grey subsoil (natural). A junction of three turf blocks were sampled in M24-73<MM09> (Figs 6 and 7), about 0.3m to the south (Fig. 2). None of the sampled turf blocks contained a visibly darker stripe indicative of their own original O horizon.

Figures 6 and 7: *Sample location M24-73<MM09>; details of white and red turf blocks (light pink, dark red and yellow), sitting on top of the original ground surface (black line), represented by a thin dark stripe on top of grey natural. Annotations and photograph: T Romankiewicz.*

A series of four loose soil grab samples were taken at the position of M24-73<MM01-03> in the field; contexts within M24-73<MM09> will be sampled in the lab. Tables 1 and 2 indicate the character of the associated sediments and their location in relation to the micromorphology samples for concordance. The corresponding sequences stretch from the current A horizon to the natural and include the turf blocks from the core and possible cheek material. A control sample was taken from beyond the micromorphology sample profile in position M24-73<MM01-03>, from the modern vegetation layer (O horizon).

Geochem MM	O-horizon	A-horizon	red clay	white clay	yellow clay	natural (pre-) Roman O-horizon
control sample	modern grass					
M24-73 <MM03>	-	uppermost L. (very thin)	main L.	-	-	-
M24-73 <MM02>	-	-	uppermost L. (thin)	central L.	lower L.	-
M24-73 <MM01>	-	-	-	-	upper L.	lower L. notable thin black stripe

Table 1: *Location 1 M24-73: sampled layers of the north mound; concordances between micromorphology (MM) and geochemical samples (L. = layer). Stratigraphy of samples from top (modern grass) to bottom (subsoil). Table: T Romankiewicz.*

Geochem MM	light red/pink clay (upper turf block)	dark red clay (lower right turf block)	yellow/white clay (lower left turf block)	dark/black old ground surface	grey clay (old top-/subsoil)
M24-73 <MM09>	Uppermost L. across	central L. to left	central L. to right	lower L. notable thin black stripe	lowest L (pre-) Roman A-horizon

Table 2: *Location 1 M24-73: sampled layers of the north mound; concordances between micromorphology (MM) and geochemical samples (L. = layer). Table: T Romankiewicz.*

9.5.1 PRELIMINARY CONCLUSIONS AND INITIAL RESULTS

Field observations suggests that the north mound was built of lozenge-shaped turf blocks throughout, at least at this lowest level that survives today. A loose core seems to be missing. The lighter material at its northern edge could represent an outer cheek, possibly some collapse with the redder/yellow core spreading over it. The weight of the core may have collapsed the cheeks outwards, or the mound was deliberately pushed northwards. This would result in a minimum surviving width for the north mound of about 2.5m, from the likely original start of the white cheek (at light circle, Fig. 2) to the vertical truncation at its southern edge (arrow, Fig. 2).

Lozenge block-shapes have been observed in the earliest fort rampart at Vindolanda in Period I, associated with the first cohort of Tungrians, *c.* 85 CE and for Period VI phase 1 associated with the *cohors II Nerviorum*, in the Antonine period, 140s-160s CE (Russell *et al*. 2022: 203, table 5). The peculiar shape has been interpreted as deriving from the specific turf-cutting tools used

by the units, and as beneficial for the stability of the rampart. The thinner ends of the blocks interlock with the thicker centres of blocks in the course above. A similar pattern can be observed here (Fig. 5).

The presence of the old ground surface would imply that turf was not cut from this area but brought in. Some transportation efforts were therefore needed; however, these could have been relatively minimal if material was sourced simply in the vicinity of the *vallum* corridor (compare with Snyder *et al*. 2023 for the Antonine Wall). Not cutting the vegetation on the construction site may have been advantageous, keeping the working surface stable and less prone to being churned up. It may have also eased the use of wheeled transport to bring the turf blocks to the construction area.

The geochemical analysis confirms the interpretation of a turf source away from the *vallum* corridor. While the turf samples are all rich in silicon and therefore sandier than the present-day A horizon (compare Figs. 8 and 9), the red and yellow turf blocks also both have a higher iron content compared with the white clay and the natural (Fig. 8, circled). This matches the pale colour of the latter two in the field. The red and yellow clays receive their colour typically from iron (III) oxide (haematite, Fe_2O_3) and goethite (yellow ochre, FeO (OH)) and hence return high iron (Fe) concentrations. Wet locations are typically iron-rich and produce a thicker root matting for their grass (Milek 2012: 121-123). This is beneficial for the turf block stability (Snyder *et al*. 2023: 138). The nearby boggy area could have provided such an iron-rich turf source. The increased iron levels in the soils to the south of the north mound seem to relate to the cremation burials and drains (see Chapter 7). Since these disturbances are later than the mound, it is unlikely that the higher iron signature here could indicate a turf cutting location. In addition, an area much larger than this or the area over the pits to the east of the milecastle (also iron-rich) would have been needed to provide sufficient turf for the lengths of the *vallum* (Snyder *et al*. 2023: 151). In contrast, stripping the ditch area could have provided the white turf blocks for the cheeks, given their comparably low iron content, which matches the modern O and A horizons and the natural subsoil there – assuming the general chemical signature remained the same over time.

A similar preference for the use of whiter, clay-rich yet sandy turf blocks for cheeks has been identified for the Antonine Wall in the Laurieston area in Falkirk. Their use there was interpreted as beneficial for the Wall's overall stability (Romankiewicz *et al*. 2022: 122-123; 128). While red, iron-rich blocks were seemingly sourced in the Antonine Wall corridor itself and used for the core, the white blocks there had to be brought onto site (Romankiewicz *et al*. 2022: 129).

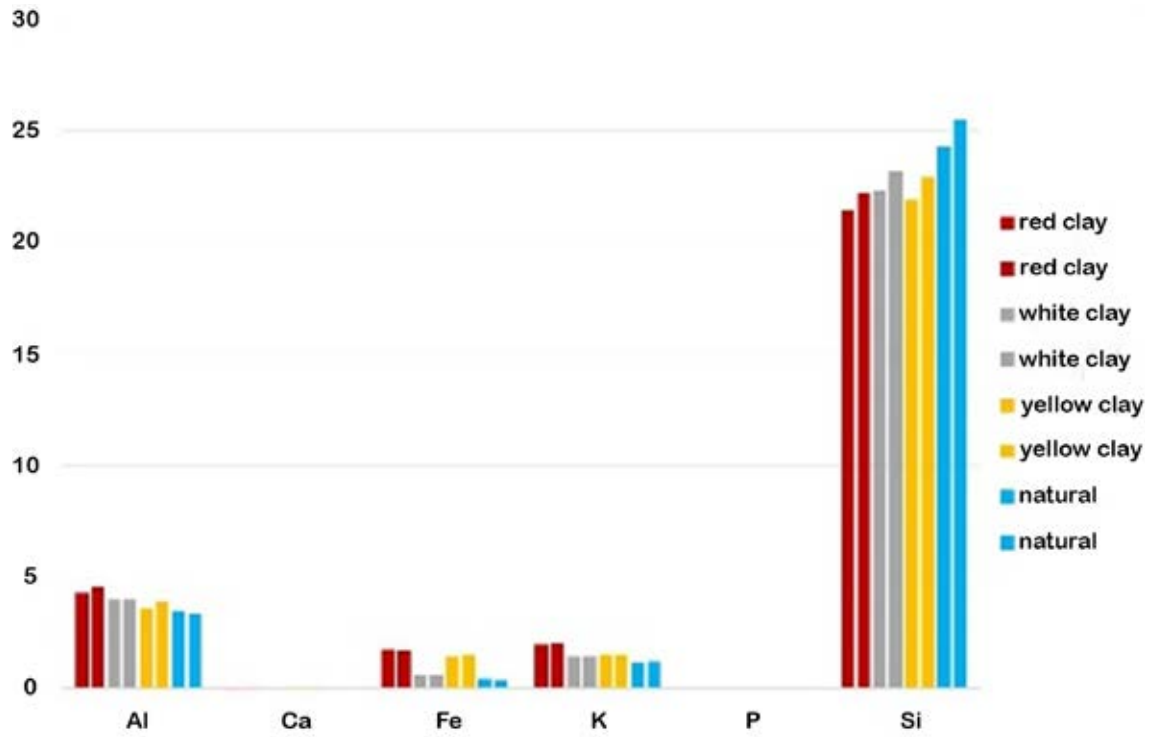


Figure 8: *Elemental analysis (percentages) for samples M24-73<MM01-03>, clay-rich (turf blocks) and natural contexts only. Analysis: G Taylor; graphs: T Romankiewicz.*

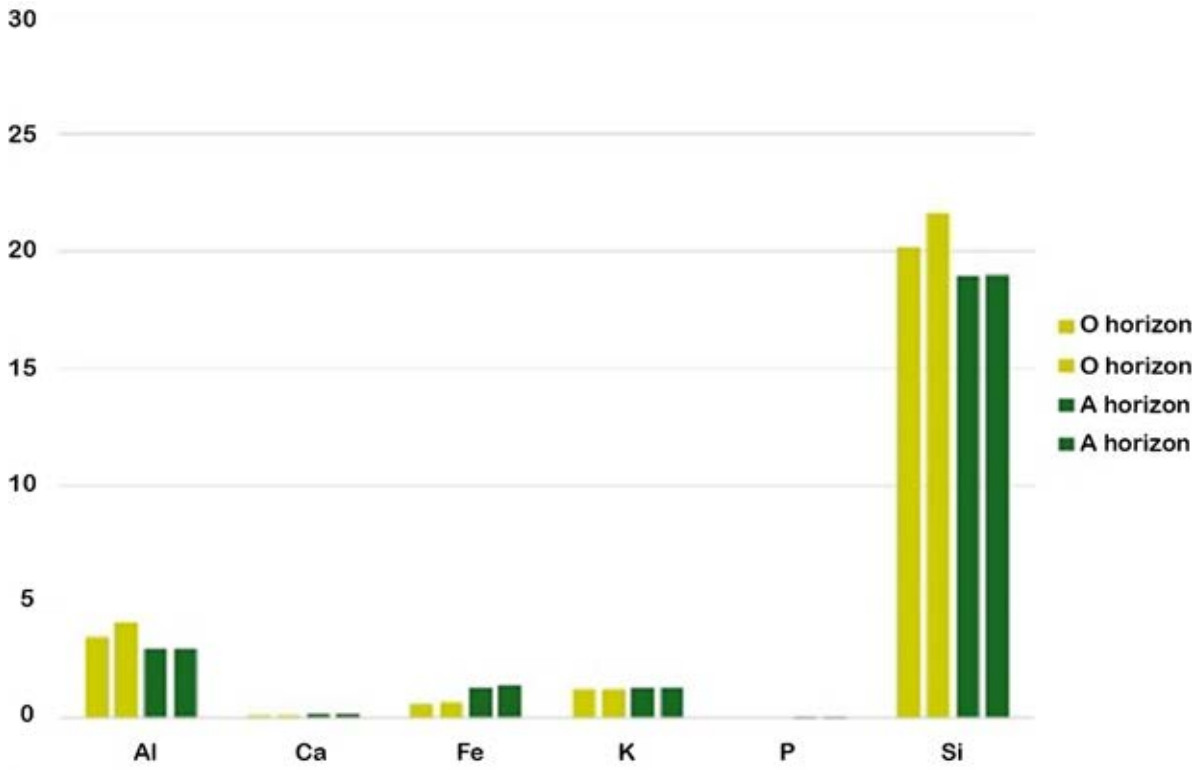


Figure 9: *Elemental analysis (percentages) for samples relating to area of M24-73<MM01-03>; O and A horizon data only (modern grass/roots and topsoil). Analysis: G Taylor; graphs: T Romankiewicz.*

9.6 SAMPLE LOCATION TWO: SOUTH MOUND

The samples at the south mound aimed at achieving a profile through the section of surviving mound material. Since the soils were hard and dry here, some could be sampled for micromorphology at a larger size than the standard Kubiena tins; they were wrapped in clingfilm and secured with masking tape.

Selecting the sample areas on the south side of the *vallum* ditch proved more difficult than for the north mound. Due to collapse and a greater extent of truncation and possibly bioturbation, the edges of the south mound were more difficult to identify. This meant that the boundaries between the south mound and the south marginal mound were hard to define. While the material in this area south of the ditch, comprising the mound and marginal mound, were given a single context number (M24-142) because of these issues, the underlying old ground surface could potentially be separated into different sections. Geoarchaeological analysis may help in defining differences here that proved hard to detect in the field. In turn, where deposits associated with the south mound and marginal mound coincided with changes in the underlying old ground surface, an attempt was made to disentangle the two mound structures (Figs. 10 and 11). The aim was to ensure that these individual features were sampled separately, and that cross-contamination could be avoided. The scenario presented here is the current working hypothesis, now to be tested with the geoarchaeological analyses.

Three samples were taken from the south mound, targeting possible turf blocks, although their preservation was much poorer than in the north mound (Fig. 10, blue arrow). Samples comprised an upper, lighter turf block and a lower, darker one (Figs. 12 and 13). The dark layer of the old vegetation surface survived at greater thickness compared to the north mound section (Fig. 14). It survived on top of a lighter grey A horizon, the ancient topsoil, which together with the subsoil was also incorporated into the samples (Table 3). This thick, darker band of the old ground surface seems to thin out further to the south, where the preservation of the south mound is also poorer. The dark band on top noticeably disappears. This may indicate a generally poorer preservation in this area. Since pink and orange clods similar in colour to the turf blocks sampled as M24-142<MM04-06> continue southwards, these may represent a more admixed core, not regularly laid turf blocks as seen in the north mound. This

would suggest that the more articulated blocks in the sampled area represent the inner cheek. The relatively chaotic pattern of turf blocks to the north of those samples, might suggest a collapse of turf walling. These appear over the darker ground surface. Together, the evidence could suggest a more mixed core material, perhaps with some turf off-cuts and loose soil extracted from the ditch cutting, while only the cheeks were constructed as solid turf walls. This would match field observations and interpretations of mound constructions elsewhere (Breeze 2015: 4).

Geochem. MM	**Grey/brown topsoil,** modern A horizon	**turf upper,** light red, mottled, gravel rich	**turf lower** darker red, mottled, gravel rich	**upper old ground surface,** black band	**lower old ground surface** grey band	**natural (subsoil)**
M24-142 <MM06>	uppermost L. (thin)	remaining L.				
M24-142 <MM05>	uppermost L. (thin)	upper L.	lower L.	lowest L. (very thin)		
M24-142 <MM04>				upper L.	lower L.	lowest L. (thin)

Table 3: *Location 2 M24-142: sampled layers south mound; concordances between micromorphology (MM) and geochemical samples (L. = layer). Stratigraphy of samples from top (topsoil) to bottom (subsoil). Table: T Romankiewicz.*

Figure 10: *Section through the area of the south mound and south marginal mound with the start of the ditch just north of the south marginal mound. Blue arrow: location of M24-142<MM04-06>. Yellow arrow: location of M24-142<MM07-08>. Annotated section photographs: T Romankiewicz.*

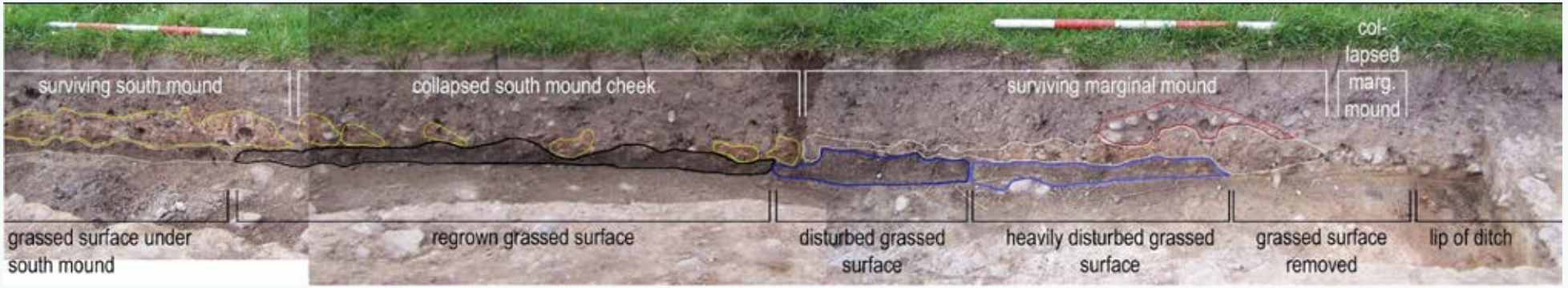


Figure 11: *Section through the area of the south mound and south marginal mound with the variation in the old ground surfaces marked out (from left to right: grey, black, dark/light blue). The organic-rich layer is less intense underneath the south mound area (grey), but thick and dark underneath its core and potential inner cheek (black). Beyond the cheek, it is even darker and richer (dark blue), sealed by turf lumps, likely to be cheek collapse. This may be an area where the old grassed over surfaces was exposed and could regrow following the building works. It sat between the inner edge of the south mound and the outer edge of the south marginal mound. Underneath the latter, the old ground surface is yet again lighter, possibly more truncated from the building works. This disappears towards the lip of the ditch, presumably the area stripped prior to excavating the ditch. From this evidence for boundaries within the old ground surface, context boundaries have been interpreted as marked here for the south mound (yellow), collapsed cheek (yellow) and south marginal mound (different layers marked in white and red). Annotated section photographs: T Romankiewicz.*

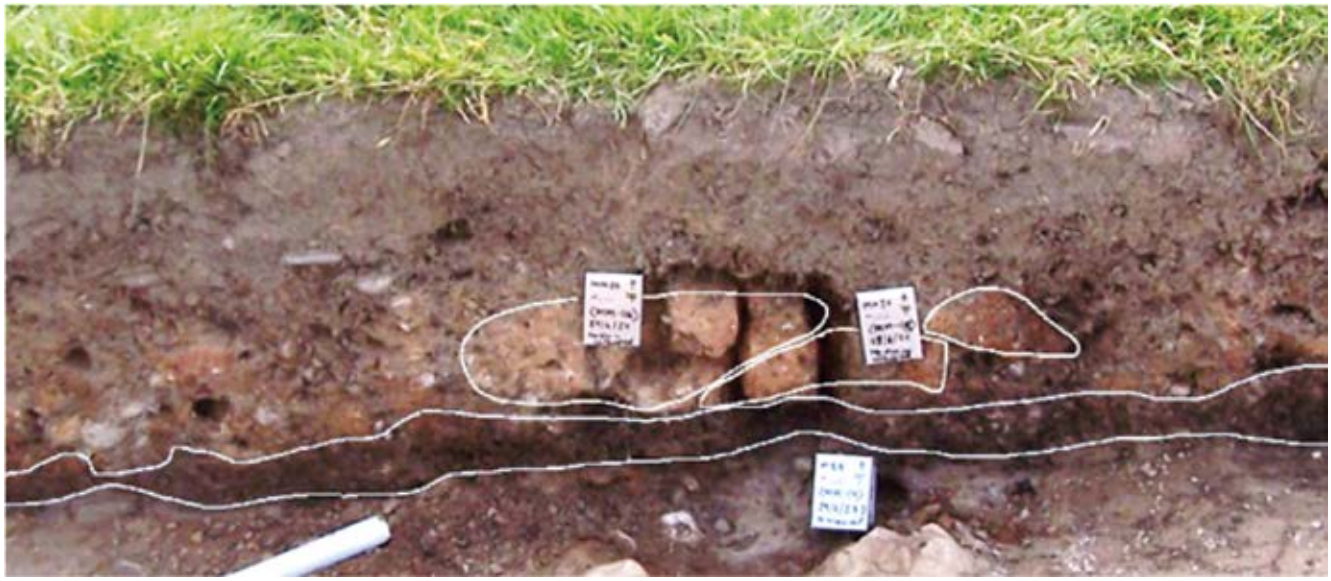


Figure 12: *Sample location M24-142<MM04-06>; outline of upper and lower turf blocks (white) and upper and lower old ground surface (O/A horizon = dark, organic-rich band between grey outlines); light subsoil/natural underneath. Annotations and photograph: T Romankiewicz.*

Figures 13 and 14: *Detail of samples M24-142<MM04-06>, with distinction of the lower ground into an upper, darker and lower, lighter context. Annotations and photographs: T Romankiewicz.*

9.6.1 PRELIMINARY CONCLUSIONS AND INITIAL RESULTS

The features in the south section, comprising the south mound, its northern cheek and its collapse northwards have been identified as per Fig. 11. This is based on field observations, in particular according to the changes in colour and thickness of the underlying old ground surface. Its thicker and darker zone has been interpreted as lying between the northern edge of the south mound and the southern edge of the south marginal mound. The old grassed-over surfaces would have been exposed here, and could have regrown following the building works, resulting in thicker vegetation and a thicker band of dark material representing its decay.

The interpretation of the dark bands as grassed-over ancient topsoil is supported by the geochemical analysis. High in sand (Si) and low in iron, the lower old ground surface (topsoil/A horizon) and the natural (subsoil/B horizon) present as expected (Fig. 15). The old vegetation layer, the O horizon, is low in sand and higher in iron, also as expected. Similarly, the upper and lower turf blocks are rich in iron, as per the blocks in the north mound, and likely sourced from a similar type of location (Fig. 15, circled).

The high phosphorus data values confirm the interpretation of the darker, upper old ground surface as the old O horizon (Fig. 15, inset; Fig. 16, "O hrzn, S mound"). High phosphorus values in this upper, and to some extent the lower old ground surface, suggest that this area had been grazed prior to construction of the south mound. In contrast, the turf blocks were sourced from less intensively grazed areas, unsurprising if these were from wetter ground.

The data values for the old ground surface under the south mound (Fig. 16, "O hrzn, S mound") correspond with data values for the modern grass, sampled in the area over the north mound (Fig. 16, "O hrzn, N mound"). Analysis of pollen from the military ditch to the south support this interpretation, yielding sheep's sorrel, common sorrel and docks pollen, which have been identified as signs of grazing in the immediate vicinity (see Chapter 8.3). The phosphorus values from the modern topsoil over the N mound also correspond with values for the soils that make up the S marginal mound, likely an ancient topsoil, sampled in M24-142<MM07-08> (Fig. 16, "A hrzn, N mound" and "A hrzn, S mar. mound").

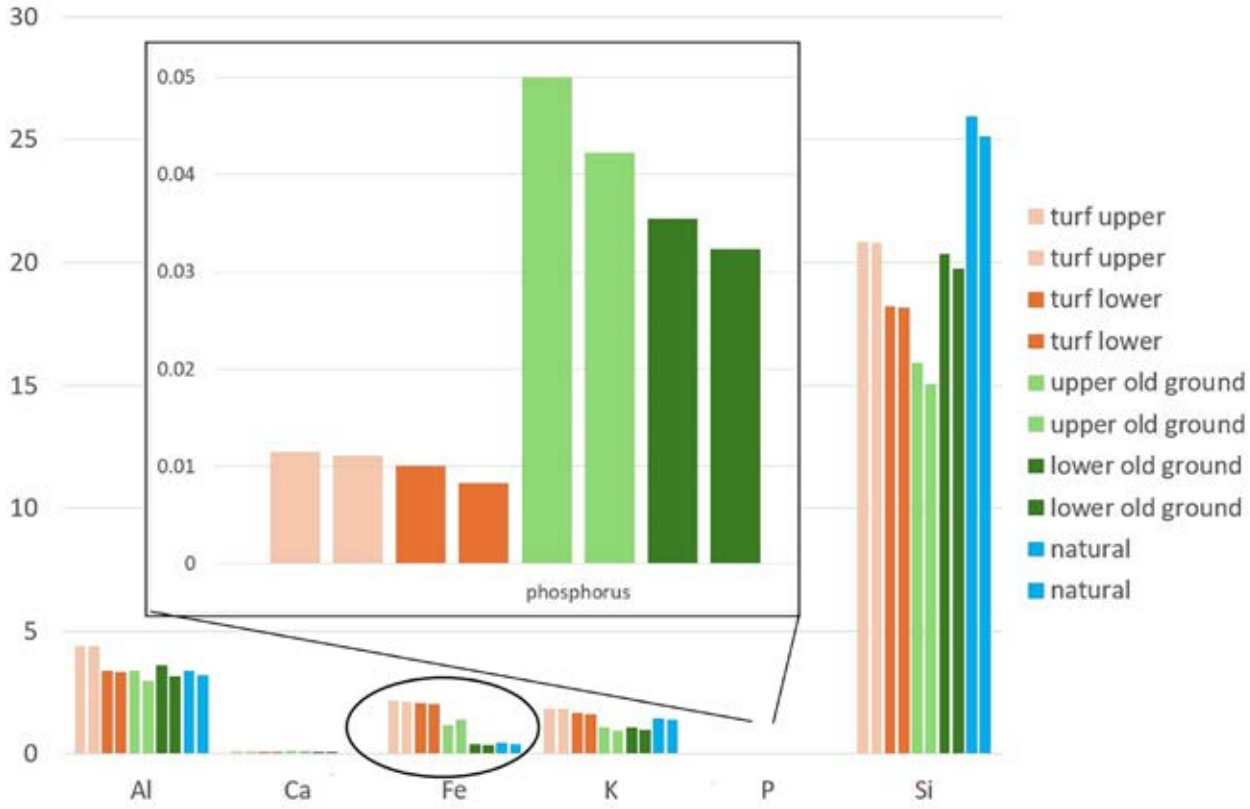


Figure 15: *Elemental analysis (percentages) for samples M24-142<MM04-06>, south mound area. Analysis: G Taylor; graphs: T Romankiewicz.*

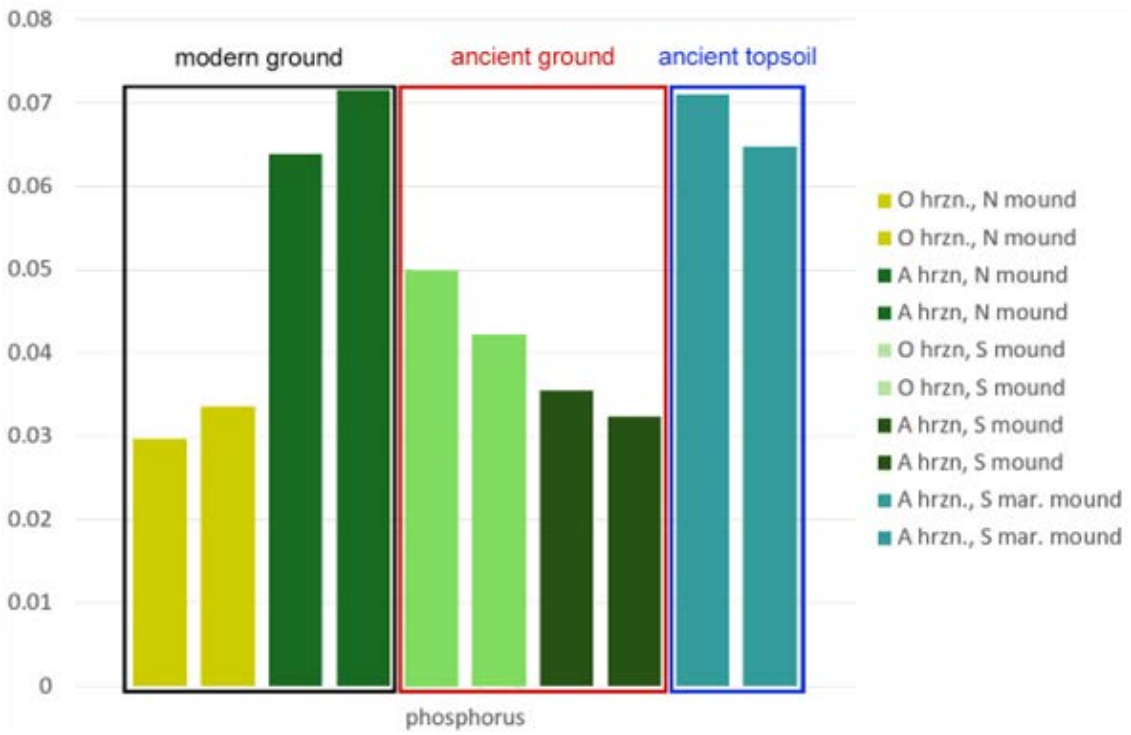


Figure 16: *Elemental analysis (percentages) for phosphorus only, samples M24-142<MM04-06>, south mound area. Analysis: G Taylor; graphs: T Romankiewicz.*

9.7 SAMPLE LOCATION THREE: SOUTH MARGINAL MOUND

The south marginal mound seems to survive immediately south of the lip of the ditch (Figs. 17 and 18) and may be represented by a mottled orange layer under a stone-rich grey/red layer (Table 4). However, no definite distinction between this material and the south mound proper could be identified during excavation. No specific turf blocks could be made out in the south marginal mound either; patches of orange continue southwards on top of an old ground surface, until the area where more defined turf blocks appear. These blocks have been interpreted as part of the south mound and were sampled as such, as per above (Fig. 11). The orange and grey layers on the berm of the ditch overlay in parts a dark grey layer, itself sitting above the grey/pink natural (Table 4). This dark grey layer is not as dark as the organic-rich layer under the sample location of the south mound, nor does it contain the thin black line as preserved under the north mound. It stops well before the lip of the ditch, where the natural subsoil was exposed (compare with caption Fig. 18).

Geochem. MM	Grey-brown modern topsoil	Darker grey-reddish, stone-rich	Orange mottling, gravel-rich	Mid-brown/ grey original topsoil	Grey/pink original subsoil/ natural
M24-142 <MM07>			main L.	lower L.	lowest L. (thin)
M24-142 <MM08>	uppermost L. (thin)	upper L.	main L.		

Table 4: *Location 3 M24-142: sampled layers south marginal mound; concordances between micromorphology (MM) and geochemical samples (L. = layer). Table: T Romankiewicz.*

Figure 17: *South marginal mound area prior to sampling (detail). Photo: T Romankiewicz.*

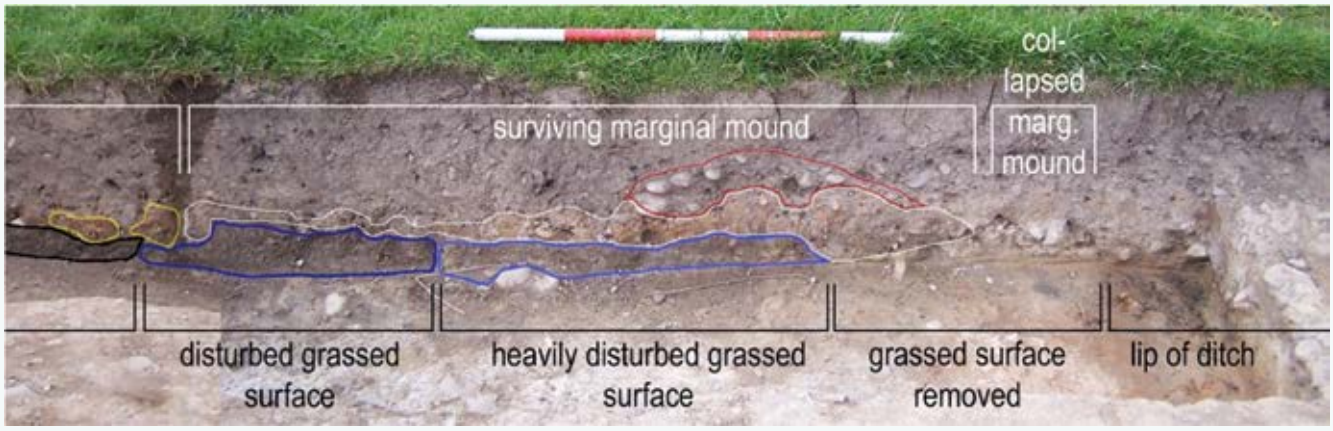


Figure 18: *South marginal mound with the interpretation of the different layers underneath it marked out (detail of Fig. 11): to left (black outline): dark, organic rich band beyond southern edge of marginal mound with collapsed turf blocks from south mound on top (yellow). To its right (dark blue): lighter area at southern edge of marginal mound, disturbed by building works; overlain by spread from marginal mound (white). Centre (light blue): thick, light grey band of surviving topsoil and more heavily disturbed vegetation, likely from trampling in relation to the ditch cutting; overlain by marginal mound layers (white, red). To right (no mark): no darker layers preserved, mound sits directly on top of light grey/pink/orange subsoil, marginal mound material above (white, red). Photo and annotations: T Romankiewicz.*

9.7.1 PRELIMINARY CONCLUSIONS AND INITIAL RESULTS

Solely based on the difference in survival of the old ground surface, the interpretation as per Fig. 18 would explain the organic-rich band and its variation in this area. The evidence taken together from underneath the south marginal mound and the lack of regrowth of grass at the lip of the ditch, might imply that not much time elapsed between the cutting of the ditch and the building of the south marginal mound. Necessarily, the turf would have been cut from the ditch area prior to ditch excavation and may have been used for the white cheeks of the north mound, while a limited area beyond the ditch was also deturfed or trampled where it remained uncut, then covered by the south marginal mound. This interpretation is supported by the apparent regrowth of vegetation in the open

area between the postulated southern edge of the south marginal mound and the possible northern edge of the south mound (Fig. 11).

This interpretation might suggest that the south mound and south marginal mound could have been built at the same time, or with not much time elapsing in-between. Alternatively, the edge of the ditch may have been cleared of vegetation again when the ditch was cleaned out at a later stage and the material for the marginal mound was dumped onto that freshly cleaned area at that time. This interpretation would correspond with general assumptions that the south marginal mound is later than the main mounds and consists of secondary ditch-cleaning material (Breeze 2015: 18). Evidence from the 2024 *vallum* excavation suggests that the lowest layers recorded in and around the base of the ditch closely match the soils described here for the make-up of the south marginal mound and its overlying material (Fig. 19). These lowest recorded layers associated with the ditch in 2024 comprise the natural into which the ditch had been cut originally as well as redeposited collapse from the sides found in the ditch base on excavation in 2024.

Figure 19: *Sample locations M24-142<MM07-08>, south marginal mound. Photograph: T Romankiewicz.*

On current evidence, both scenarios for the construction of the south marginal mound are plausible, either contemporary with the south mound, or as a result of later ditch cleaning. The higher phosphorous level within the soils of the marginal mound might perhaps point towards the interpretation of secondary cleaning, if the phosphorus represents re-established vegetation or washed-in phosphorus from the surrounding grassland collecting at the bottom of the ditch (compare to Fig. 16). Further geochemical analysis will be needed to confirm this important aspect.

9.8 INTERIM DISCUSSION AND PRELIMINARY INTERPRETATION OF THE *VALLUM* AT MAGNA

Drawing together all the evidence from the north and south mounds and the marginal mounds as observed in the field and as analysed so far using geochemical methods, a few initial interpretations can be put forward. These are preliminary and may be revised once all layers have been analysed using geochemical methods and characterised by

micromorphological analysis. At this interim stage, the existing field evidence as described by Breeze 2015 could generally be confirmed: the old ground surface continues underneath the mounds, the north and south mounds are of sound construction, including turf cheeks, while the material of the marginal mound is looser and less homogenous. The specific details at Magna seem to suggest that:

- North and south mounds have been built over the original, grassed-over ground surface.

- Turf blocks used in their construction were therefore not sourced in the wider *vallum* corridor.

- Their generally iron-rich composition suggests they were cut from a wetland location, which creates a denser root matting, beneficial for structural stability.

- This implies the main *vallum* mounds were carefully constructed and with some expenditure on labour and transportation.

- The north mound as surviving seems to have been constructed with turf blocks throughout; while red and iron-rich material was used in the core, its northern cheek used lighter, perhaps more clay-rich blocks.

- The lighter cheek blocks for the north mound could have been sourced from the ditch area itself, where soils seem to match the pale colour of the cheek turf blocks.

- The southern edge of the north mound has been truncated, likely by 3rd century activity.

- The south mound consisted of iron-rich turf cheeks facing its northern edge; the core contained admixed material, likely turf offcuts and loose soil extracted from the ditch.

- The southern edge of the south mound survives poorly, likely truncated by later ploughing.

- The greater stability suggested by the north mound construction might have better withstood an attack from the north, or as the excavators noted, withstood downward-pouring rainwater or hillwash from the higher ground to the north; it was better built to prevent the mound from being washed into the *vallum* ditch.

- The south marginal mound does not seem to contain turf blocks; its materials are also different from the south mound core, containing more gravel and small stones. The make-up is distinctively layered, representing different soil matrices, some more humic, others more iron-rich.

- They could represent original material excavated from the ditch or later ditch infill that was cleared out; these soils match the material encountered at the bottom of the *vallum* ditch on excavation in 2024.

- Since the material excavated in 2024 matches the natural into which the ditch was cut as well as collapse found in its bottom, this evidence remains inconclusive as to whether the south marginal mound was built from the original ditch cutting or from a later cleaning event.

- The south marginal mound was built over the deturfed area at the ditch lip and over disturbed topsoil/truncated vegetation towards the south. This suggests a construction time close to the original ditch excavation or that vegetation was cut here again in the secondary ditch cleaning.

- The area between the south marginal mound and the south mound had not been deturfed and grassland could recover in this strip after construction; the area probably saw little traffic once the south marginal mound had been constructed.

9.9 FINAL COMMENTS

The general low readings of phosphorous (P) in the turf soils is intriguing; the low readings for the modern controls suggest that contamination from the modern grazing regime is low. A variety of factors might affect the interactions of phosphorus within a soil (Holliday and Gartner 2007). For instance, the phosphorus could have been mobilised when exposed to weather or microorganisms. Further analysis may help to clarify this aspect, since chemical and microbial analysis have shown at Vindolanda that archaeological soils can be discerned from modern or natural soils, using their geoarchaeological signatures (Taylor *et al*. 2023). More analysis of the microstratigraphy and soil characteristics of the soils from the *vallum*, including their formation processes, will now be undertaken in the micromorphological analysis of the resinated samples, combined with additional geochemical testing.

10. ENVIRONMENTAL MONITORING PROBES

FRANKI GILLIS & DR GILLIAN TAYLOR

The weather station and underground monitoring probes are an essential tool for helping assess the environmental conditions at Magna. The system was installed in April 2022 and automatically uploads all data every 15 minutes. Wall-E (Fig. 1), as the system is affectionately known, measures ambient air temperature, daily rainfall, wind speed, electrical conductivity, soil moisture, groundwater level, oxidation reduction potential (ORP), pH, and other variables. The advantage of Wall-E is that it continually monitors the site, and data is uploaded into an easily accessible cloud database. To date, over two million data points have been collected since Wall-E was installed.

Figure 1: *Picture of Wall-E, orientated northwest, sitting within the peatland. Photo taken in March 2025.*

Wall-E is located approximately 23 metres north of a post-medieval well (see Chapter 2.5.1) in a peatland area. Research into the peatland and how it affects the soil environment is ongoing. The peatland pre-dates the Roman period of occupation by over 4000 years (see Table 1). A soil core taken 9.42m east from Wall-E contained wood samples which were identified as *betula sp.* (birch) and *alnus sp.* (alder) by Dr Rob Sands of University College Dublin (see Appendix 9). Table 1 shows the radiocarbon dates for the four samples recovered from the core.

Sample No.	Depth from Surface (m)	Wood Identification	Date (calibrated before)	Probability of Radiocarbon Date
1	.70	*Betula sp.*	6205 - 6102 cal. BP *(4256 – 4153 cal. BCE)*	47.00%
2	.80	*Alnus sp.*	4260 – 4156 cal. BCE 6209 - 6105 cal. BP *(4260 – 4156 cal. BCE)*	48.40%
3	1.11	*Betula sp.*	6299 - 6197 cal. BP *(4350 – 4248 cal. BCE)*	95.40%
4	1.35	*Cf. Alnus sp./ Betula sp.*	6798 - 6667 cal. BP *(4849 – 4718 cal. BCE)*	87.70%

Table 1: *Table showing wood sample identification and corresponding radiocarbon dates.*

In this interim report, the following variables will be considered – rainfall, ORP, and pH. These environmental factors predominantly impact the archaeological environmental preservation.

10.1 RAINFALL

Fig. 2 shows the daily rainfall data from 2024, indicating it was a wet year, with a mean rainfall of 1.19mm per day and a total annual rainfall of more than 839.4mm. This does not include the loss of data between 18/11/2024 – 2/12/24, due to an instrument fault. January had the highest amount of rainfall, with a daily mean of 1.81mm (Fig. 3) and a total of 106.6mm (Fig. 4); meanwhile, June had the lowest amount of rainfall, with a daily mean 0.65mm (Fig. 3) and a total of 41mm (Fig. 4). Persistent rain made excavation conditions difficult for staff and volunteers, as reflected in the near constant flooding of the trenches (see comments in Chapter 2.2 and 2.5).

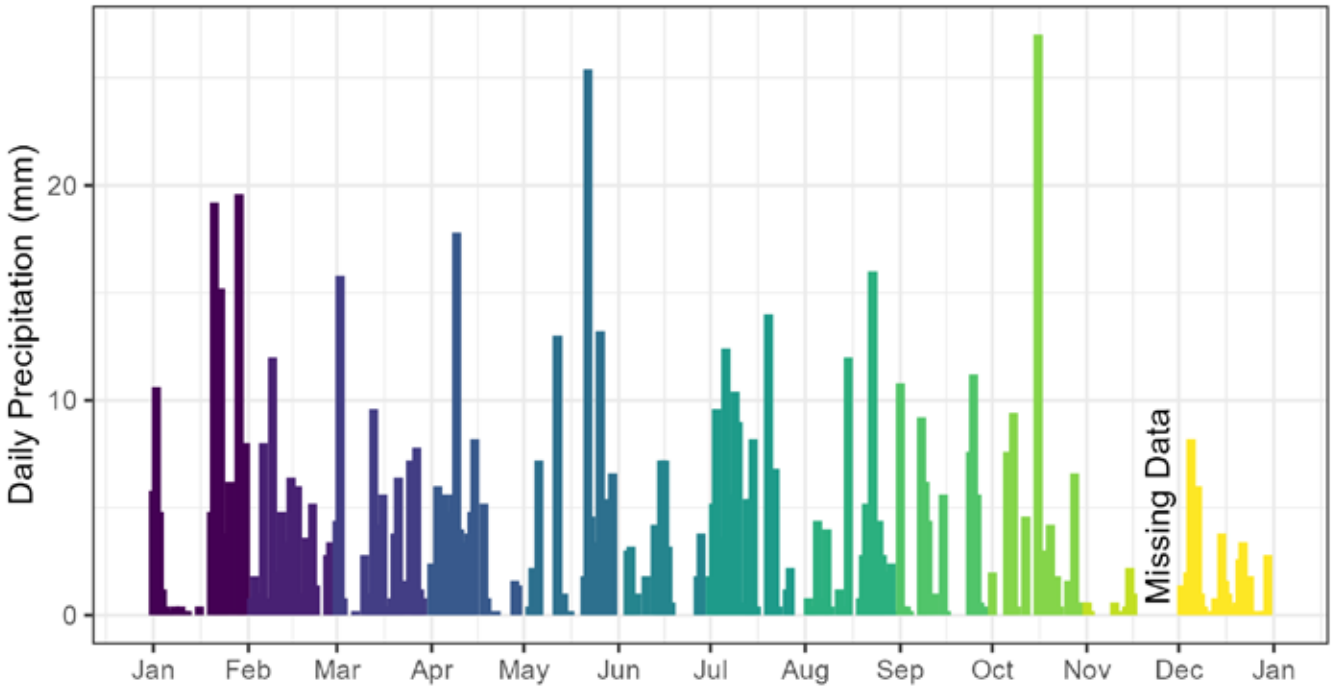


Figure 2: *Bar chart showing the daily rainfall amount (mm) in January – December 2024. Missing data refers to an instrument fault period and no data was recorded – November readings are thus abnormally low.*

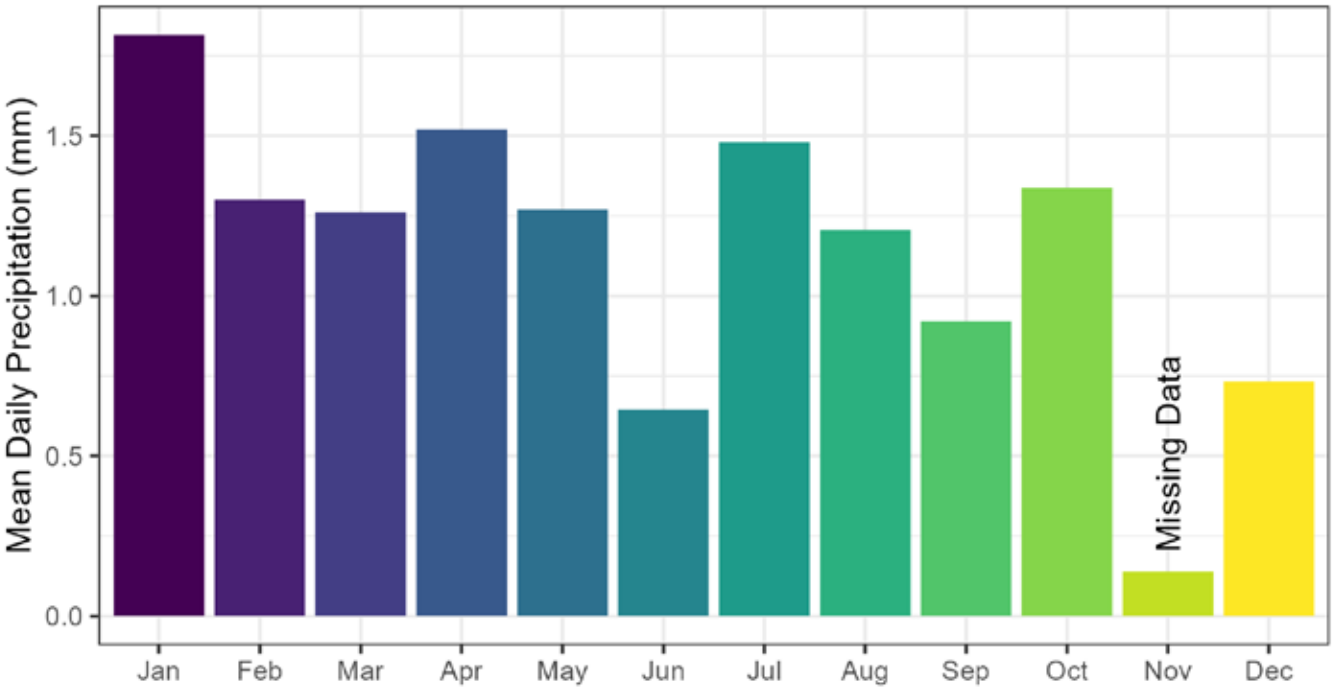


Figure 3: *Bar chart showing the mean daily rainfall amount (mm) for each month in January – December 2024. Missing data refers to an instrument fault period and no data was recorded – November readings are thus abnormally low.*

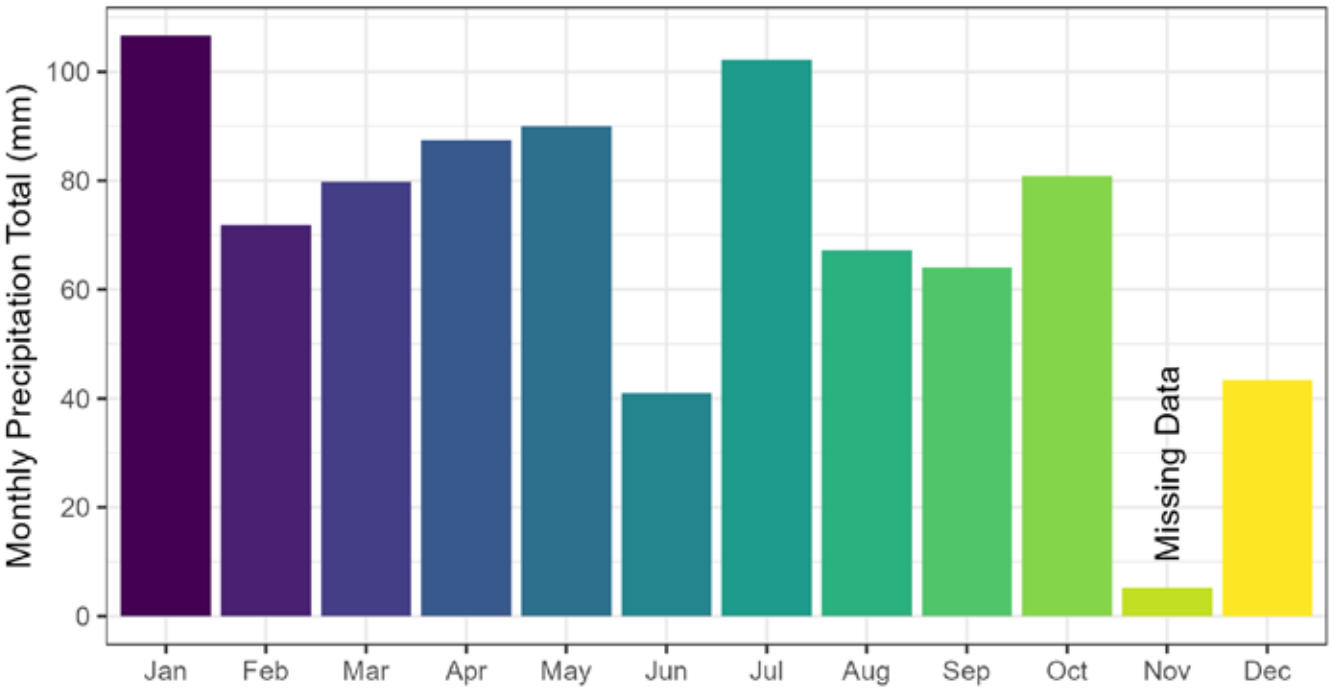


Figure 4: *Bar chart showing the monthly rainfall totals (mm) in January – December 2024. Missing data refers to an instrument fault period and no data was recorded – November readings are thus abnormally low.*

10.2 ORP AND PH

ORP and pH are two of the most essential measurements at archaeological sites with environmental remains. ORP measures the energy potential between oxidising and reducing agents, such as oxygen and/or chlorine, where negative values can indicate an anaerobic environment which preserves organic material remains, such as wood and leather. Most chemical degradation is significantly slowed without the presence of oxygen, which is the key energy source. Positive values indicate an aerobic environment which increases the rate of degradation for organic material.

pH measures the acidity or alkalinity of a substance on a scale of 0-14, with 7 or less being acidic, 7 being neutral, and 7 or more being alkaline. An acidic soil environment significantly reduces the strength of wood and breaks down collagen fibres in leather. However, an alkaline soil environment can also break down the internal structure of wood and draw moisture from leather, leaving it more brittle.

Fig. 5 and Fig. 6 show the fluctuating ORP and pH levels between January – December 2024. These figures are modelled using linear regression which plots how a variable (such as ORP or pH) responds to an explanatory variable (such as date/time).

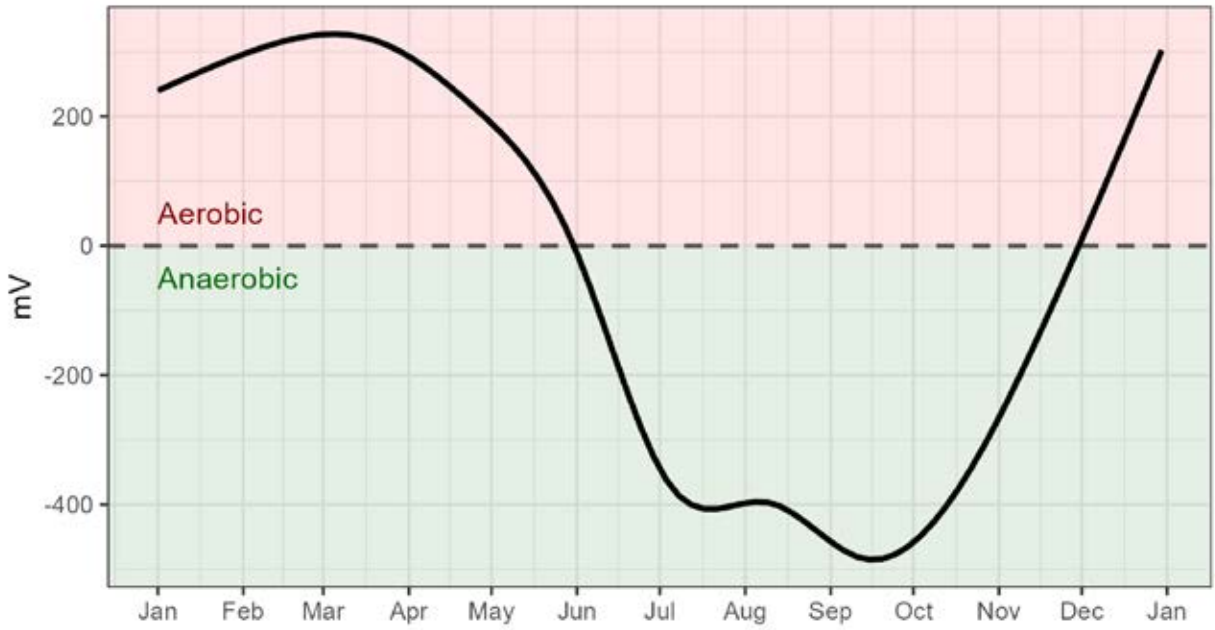


Figure 5: *Linear regression results for ORP during January - December 2024.*

Linear regression results from ORP measurements between January and December 2024 are plotted in Fig. 5. The change between negative and positive, which correlates to anaerobic (green) and aerobic (red) environment, indicates a seasonality effect. During warm summer months, the soil environment is anaerobic and then during colder, wet winter months the soil environment is aerobic. Wall-E is located within a complex ecosystem, potentially a fen-like area, where it collects water from various sources such as groundwater, surface run off, and rainfall. In comparison to the 2023 data, where the soil aerobic environment was from December to May, the 2024 data show a longer aerobic period from November to June 2024. As previously discussed, the longer time artefacts are in aerobic environments, the greater the degradation will be.

As data collection continues, a more complete picture of the soil environment will help reveal trends supported by scientific rigour. Nevertheless, the current observation from these three years of data suggests that the aerobic period has increased each year, and if this trend continues it implies a finite period of time before remaining anaerobic soil conditions at Magna fort will be lost.

Fig. 6 shows the groundwater pH at Magna between January and December 2024. pH has an inverse relationship to the ORP measurement, as seen when comparing Fig. 5 and Fig. 6. The pH fluctuation is within expected values, although its change within a relatively short time is concerning. The team will continue to monitor rainfall and visual ecological changes across the site. Archaeological

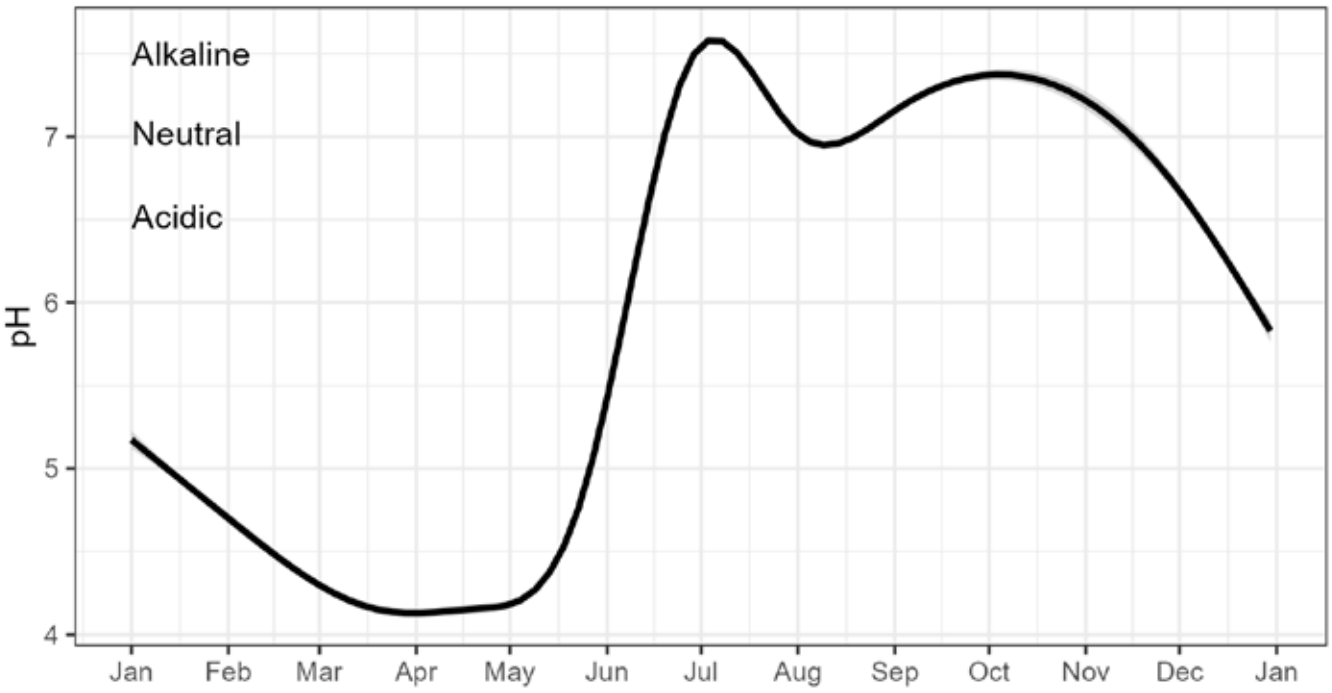


Figure 6: *Linear regression results for pH during January - December 2024.*

sites are facing significant changes and degradation of buried organic material due to climate change. Utilising monitoring stations such as Wall-E and those at Vindolanda can help track the fluctuating soil environment and aid the development of mitigation strategies.

10.3 CORRELATION MATRIX

Fig. 7 is a Spearman's rho correlation matrix which shows the relationship between four variables recorded by Wall-E: ambient temperature, daily rainfall, ORP, and pH. Fig. 8 is a Kendall's tau correlation matrix analysing the same variables. The number within the box is the *r* value while the asterisks next to the number indicates the strength of the association, known as the *p* value. The *r* value in a Spearman's rho correlation test indicates the degree of association between variables in a linear relationship. The correlation coefficient in a Kendall's tau correlation test indicates the strength of dependence between variables (Okoye and Hosseini 2024: 251). Within that, numbers closer to +1 (blue) indicate a high positive correlation while numbers closer to -1 (red) indicate a high negative correlation. Spearman's rho and Kendall's tau tests were chosen over the more common Pearson's product-moment because the datasets are primarily distribution-free (see Appendix 8: Distribution Plots). The advantage of Spearman's rho is that the test is well equipped for large datasets, however it is more sensitive to outliers which can results in errors. The advantage of Kendall's tau is that it is a more robust test, however it works better with smaller datasets. Both correlation tests have been computed to allow for comparison between the two results.

Fig. 7 shows a moderately negative association between temperature and ORP but this is not as strong as the high negative association between ORP and pH. If this relationship continues to be statistically significant, then that can help determine what soil environment variables other archaeological sites might need to measure to determine their preservation conditions. It is curious that rainfall has no statistically significant association with ORP or pH; however, this is likely because correlation analyses the linear relationships between two variables. Rainfall evidently does not have a linear relationship with these two variables but may have a nonlinear relationship. As such, further statistical analyses will be completed to have a better understanding of relationships within the data. Fig. 8, as a whole, shows less strong correlation between the variables. ORP and pH have a moderate degree of dependence, but other relationships have a weak degree of dependency. Comparing Fig. 7 and Fig. 8 poses the pros and cons of varying correlation test methodology and demonstrates different relationship types between the variables. As more data is collected, additional statistical analyses will be applied so that the relationship between climate change and the soil environment can be better understood.

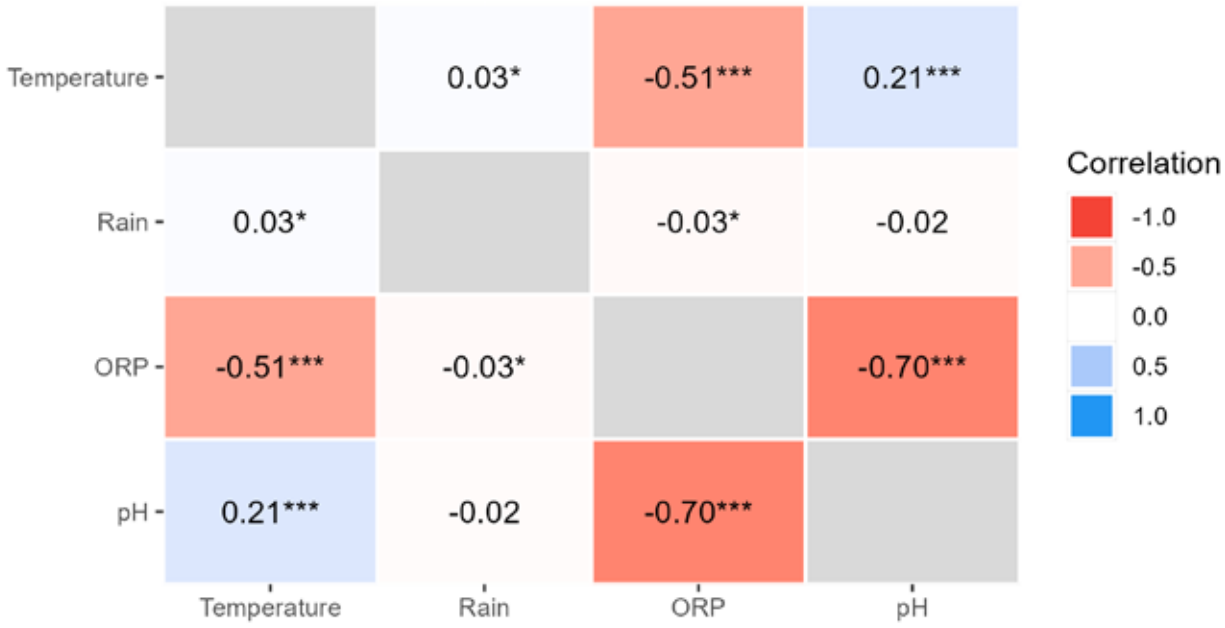


Figure 7: *Spearman's rho correlation matrix demonstrating the degree of association between ambient air temperature, rainfall, ORP, and pH.*

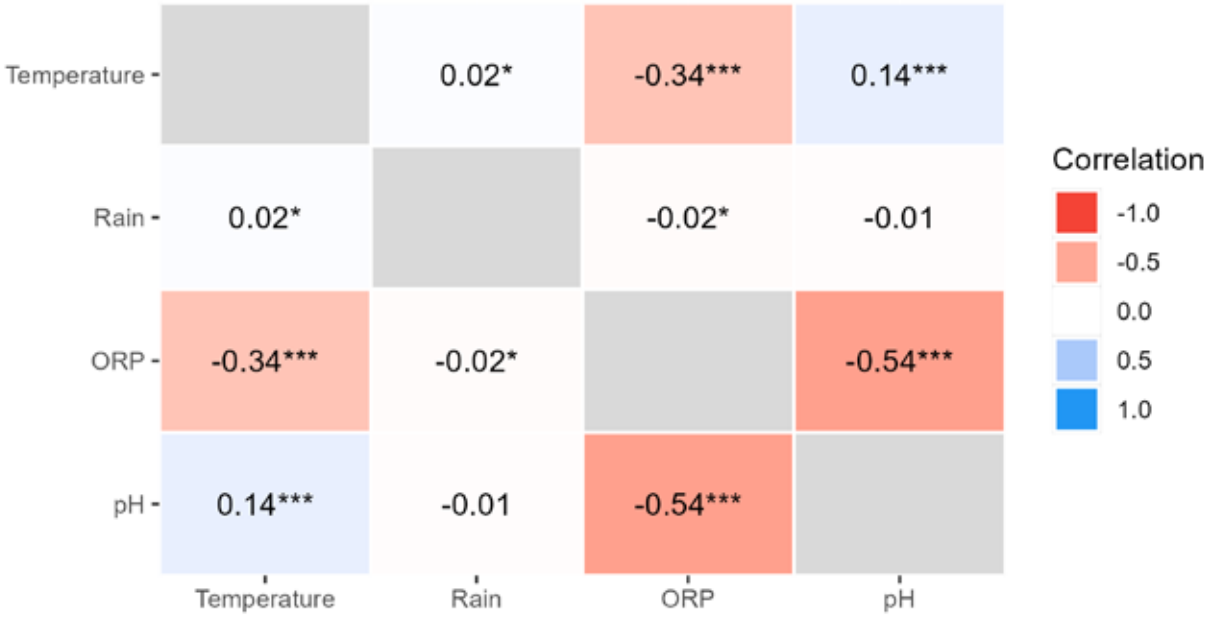


Figure 8: *Kendall's tau correlation matrix demonstrating the strength of dependence between ambient air temperature, rainfall, ORP, and pH.*

11. POTTERY REPORT

DR CRISTINA CRIZBASAN

11.1 INTRODUCTION

The pottery assemblage from the Magna 2024 excavation season consisted of 736 sherds which amounted to 12.34 kilograms. Out of these, 89 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 451 and an estimated vessel equivalent (EVE) of 9.26.

Overall, the assemblage revealed that the pottery consumption in the North Allotment field ranged extensively in terms of fabrics and forms, in accordance with its chronological context. The identified fabrics included those that had clearly been supplied to the site from some distance away as well as a range of material that showed local production was an important part of the general supply. This is particularly obvious in the pre-Hadrianic period which showed the greatest diversity in fabric supply to Magna. These aspects will be discussed at length in the following sections.

The structure of this report covers the following key information. Firstly, it provides an in-depth analysis of the overall pottery quantities based on two different criteria: period (pre-Hadrianic, early 2nd century; late 2nd century; 3rd century; 4th century) and area (extramural area of MC46; *vallum* area; double ditches; northern bog area and well complex). The chronological criterion assesses the quantities of pottery per period as a way of understanding the overall flux of supply over time, as well as the peak periods of local production at the site.

Conversely, the spatial perspective looks at the pottery's quantitative and qualitative distribution across different social contexts associated with different functions. While the whole site is related to military activity, some areas may be more specialised than others. For example, the pottery from the well complex area could be connected to more specific functions related to industrial activity (see Chapter 2.6.3), whilst the extramural area of milecastle 46 and the *vallum* are likely to have been related to wider, more general military activities in the frontier environment. Differentiating pottery consumption by areas reveals their associated functional categories, forms and fabrics, which ultimately sheds light on the ways in which pottery was engaged in these activities and the sort of needs it would support.

The second part of the report focuses on fabric supply. This approach highlights the relationship between fabric quantities and chronology, the diversity of fabrics and their link to organised supply and production patterns. The functional analysis of forms within each fabric is also discussed, as well as any association of specific fabric classes, such as *amphora*, with any particular context types. Lastly, all these trends and patterns are dissected, analysed and discussed in their regional context by comparison with other assemblages from nearby sites for alternative perspectives on pottery consumption on Hadrian's Wall.

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

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

11.2 METHODOLOGY

The pottery data for this report have been analysed both qualitatively and quantitatively. The qualitative data refer 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 very specific fabrics into more flexible categories that can be employed in wider comparative studies. These categories follow a common northern typology series employed previously at sites such as Catterick (Evans 2002), Binchester (Evans and Ratkai 2010) and Vindolanda (Alberti-Dunn forthcoming; Vindolanda North Field report forthcoming). The approach relies on nine broad fabric classes as listed below.

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 3. Such data are 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: The form classes designate 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). The form types refer to specific vessel profiles that have been already identified through typologies; for example, the Gillam types (1968) or the established Dragendorff typology for Samian ware. The addition of 'form class' and 'form type' allows one to explore the range of vessels within each fabric category, enabling an understanding of its functional role by displaying the predominant vessels that were produced for each fabric. For example, cooking jars would be made mostly in reduced (R) greywares, while tablewares and flagons would be made in oxidised (O) fabrics.

Quantitative data refers to the information which describes the amount of analysed pottery. The current assemblage has been quantified by five methods: number of sherds (NoSh) and weight (Wt) to understand the quantities of materials, which is especially useful in comparisons with other bulk finds; minimum number of rims (MNR), estimated vessel equivalent (EVE), and average estimated number of vessels (ENVavg) to grasp the quantities of individual vessels.

The discussion considers all pottery from the stratified, Roman-dated contexts, focusing only on the Roman periods identified at the site, that is pre-Hadrianic into the 4th century. When residual fragments have been identified, they have been left in the assemblage due to their potential to reveal pottery consumption trends over time. This approach provides the peak period of their use, as well as a perspective on the gradual collapse of fashions as these vessels become residual and are replaced by new ones.

11.3 BASIC QUANTITIES

The 2024 Magna excavations produced 224 contexts. Of those, 152 contexts lacked any Roman pottery, while 72 contexts contained at least one Roman sherd. Additionally, from those containing Roman pottery, 17 contexts dated to the prehistoric, medieval or post-medieval periods. Therefore, out of 224 contexts, 165 were dated as likely to have been Roman and from those, 55 contained at least one Roman pottery sherd (Table 2).

Context	Nos of contexts with Roman pottery	Nos of contexts without Roman pottery	Total no of contexts
Roman	55	110	165
Non-Roman	17	42	59
Total	**72**	**152**	**224**

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

11.3.1 QUANTITIES BY PERIOD

The 2024 Magna excavations encountered five key Roman periods of activity (pre-Hadrianic, early 2nd century, late 2nd century, 3rd century and 4th century), and three non-Roman periods (prehistoric, medieval and post-medieval). For this interim report, only the Roman periods have been considered for further analysis.

Table 3 below highlights the distribution of Roman pottery quantities across these periods based on the five quantification methods. Overall, the 3rd century contexts contained the most pottery. When focusing on independent quantifying techniques, however, further insights emerge. If for example, the number of sherds (NoSh) are indicative of a similar rate of brokenness across the majority of the analysed contexts. The weight perspective shows that the pre-Hadrianic material contained a higher number of heavier vessel types, such as *amphorae* and *mortaria*. The MNR, EVE and ENVavg all show the quantities of individual vessels. In this case, the 3rd century contained the highest number, except the case of EVE, where it is overtaken by the 4th century assemblage due to the presence of a partially complete rim of a calcite-gritted jar. In short, Table 3 below shows the various facets of interpretation one could obtain from employing varied quantification methods, depending whether the focus is on individual vessels, general material distribution or rate of fragmentation.

Period	NoSh%	Weight%	MNR%	EVE%	ENVavg%
Pre-Hadrianic	17.2	41.3	12.5	9.8	16.1
Early 2nd c.	15.6	15.5	12.5	8.9	21.1
Late 2nd c.	14.2	7.2	20.3	22.6	16.8
3rd c.	28.7	19.8	34.4	27.6	31.9
4th c.	24.2	16.2	20.3	31.1	14.1
Total	**499**	**8565**	**64**	**7.11**	**298**

Table 3: *The distribution of pottery quantities (%) across the four North Allotment field trenches.*

Each Roman period identified in the 2024 season has been further analysed in terms of pottery quantities and originating contexts (Table 4 to Table 8), to understand the fluctuations of pottery flow in this environment. The assemblage has been quantified based on the number of sherds (NoSh), weight, minimum number of rims (MNR), estimated vessel equivalent (EVE), and an average estimated number of vessels (ENVavg). Raw numbers and percentages have been provided: while the former allows one to understand the objective quantities of Roman pottery in each context and in each period respectively, the latter provides a better comparative perspective across contexts and periods. This method enables one to isolate contexts of outstanding quantities for in-depth analysis.

Pre-Hadrianic

The pre-Hadrianic period produced 86 sherds of Roman pottery from the contexts shown in Table 8. At a glance, contexts M24-3 and M24-133 contained 66.2% of this quantity. Less abundant, yet significant, is context 18 which accounted for 18.6%. The rest of the sherds were scattered across the remaining contexts in small quantities. The weight indicates that 62.3% of the pottery came from context M24-18. This is mostly due to nature of the pottery this context contained, with 16 sherds of an *amphora* having a combined weight of 2205 grams. When assessing individual vessel quantities, all MNR, EVE and ENVavg corroborate the initial results from NoSh, with contexts M24-3 and M24-133 as the most abundant. These preliminary results show that Magna and milecastle 46 experienced some Roman activity in the pre-Hadrianic period, likely linked to military detachments moving around and possibly preparing the ground for the new frontier that was going to be built, namely, Hadrian's Wall.

Magna fort and its landscape were already an established part of the Roman frontier in the pre-Hadrianic period as part of a system known today from its medieval name as the 'Stanegate road'. It was one of the key forts, along with Vindolanda, Corbridge, Carlisle and Nether Denton, which all

protected the east-west road across the central part of the northern frontier (Breeze and Dobson 1985: 8-9). Therefore, this area would have been regularly patrolled by Roman forces, meaning that the pottery supply was already well-established in the pre-Hadrianic period. In fact, at that time, the military sites from Northern England would have even displayed comparable assemblages containing vessels made in similar styles (Gillam 1976: 180-181). Webster (1992: 113) adds to this observation by mentioning the existence of special arrangements with traders or potters, which attracted a predominantly general trade at all military bases. All these suggest that the pre-Hadrianic period at Magna is also expected to attract pottery, as this area was already occupied, generating demand from the settling communities.

Pre-Hadrianic										
Context	**NoSh**	**NoSh%**	**Weight**	**Weight%**	**MNR**	**MNR%**	**EVE**	**EVE%**	**ENVavg**	**ENVavg%**
3	34	39.5	228	6.4	2	25.0	0.23	32.9	11	22.9
18	16	18.6	2205	62.3	-	-	-	-	1	2.1
27	4	4.7	34	0.8	-	-	-	-	4	8.3
33	1	1.2	1	0.2	-	-	-	-	1	2.1
54	1	1.2	290	8.2	-	-	-	-	1	2.1
65	2	2.3	10	0.3	-	-	-	-	2	4.2
133	23	26.7	696	19.7	5	62.5	0.43	61.4	23	47.9
139	1	1.2	7	0.2	-	-	-	-	1	2.1
141	4	4.7	66	1.9	1	12.5	0.04	5.7	4	8.3
Total	**86**	**100.0**	**3537**	**100.0**	**8**	**100.0**	**0.70**	**100.0**	**48**	**100.0**

Table 4: *Breakdown of each pre-Hadrianic context and its associated pottery quantities.*

Early 2nd Century

The Hadrianic period produced a total of 78 sherds of Roman pottery, as exhibited in Table 5. More than half of these fragments (53.9%) originate from contexts M24-44 and M24-132. Less abundant, yet significant, are contexts M24-128, M24-14, M24-150 and M24-15, which overall amounted to 35.9% of the total quantity. The rest of the sherds are scattered across the remaining contexts in small quantities. Regardless of the quantitative method employed, contexts M24-44 and M24-132 are the most abundant in terms of both individual vessels and general material quantities, followed by M24-128 and M24-150. The quantities are similar to the pre-Hadrianic period, showing that the development of this area has continued as part of preparations of the military landscape for the construction of the Hadrianic frontier.

Hadrian's Wall followed as a continuation of the Stanegate system to manage populations from the North. The hit-and-run attacks and movement control became increasingly challenging to handle and, in the end, the solution became a physical barrier (Symonds 2020: 50). In its full development, this system consisted of three separate linear barriers (a ditch to the north, the curtain wall behind it, and the *vallum* ditch), small military installations (milecastles and turrets), larger forts (built to accommodate an entire auxiliary unit) and a purpose-built gateway known as Portgate (Symonds 2020: 51). Building all these elements required manpower, which in turn would have generated demand to supply their consumption needs, including pottery. Therefore, it is in this light that the pottery arrives at the site at the beginning of the 2nd century, when the Wall frontier preparations were in development and the troops focused along this area had increased pottery demands.

Early 2nd Century										
Context	**NoSh**	**NoSh%**	**Weight**	**Weight%**	**MNR**	**MNR%**	**EVE**	**EVE%**	**ENVavg**	**ENVavg%**
14	7	9.0	78	5.9	-	-	-	-	5	7.9
15	5	6.4	78	5.9	-	-	-	-	4	6.3
21	2	2.6	2	0.2	-	-	-	-	1	1.6
44	17	21.8	392	29.6	3	37.5	0.17	27.0	11	17.5
73	2	2.6	18	1.4	1	12.5	0.05	7.9	2	3.2
128	10	12.8	164	12.4	-	-	-	-	7	11.1
132	25	32.1	487	36.8	3	37.5	0.24	38.1	23	36.5
148	3	3.8	14	1.1	-	-	-	-	3	4.8
150	6	7.7	75	5.7	1	12.5	0.17	27.0	6	9.5
174	1	1.3	17	1.3	-	-	-	-	1	1.6
Total	**78**	**100.0**	**1325**	**100.0**	**8**	**100.0**	**0.63**	**100.0**	**63**	**100.0**

Table 5: *Breakdown of each early 2nd century context and its associated pottery quantities.*

Late 2nd Century

The later 2nd - century produced in total 71 sherds of Roman pottery as exhibited in Table 6. More than half of these fragments originate from contexts M24-22, M24-169 and M24-207, accounting for 52.1% of the total quantities in this period. Mid-tier, yet significant nonetheless, are contexts M24-14, M24-15, and M24-150, with quantities between 6.4 and 9.0% of the total. The rest of the sherds are scattered across the remaining contexts in reduced quantities. Overall, regardless of the quantitative method employed, contexts M24-22, M24-169 and M24-207 are the most abundant in terms of both individual vessels and general material quantities. These quantities remain comparable with previous periods showing no significant increase. In fact, the total values are slightly lower than those observed previously.

This lack of significant growth in pottery quantities at the site is likely linked to the military conflicts unravelling at that time. Around 158 CE, new measures were put in place to begin the return to Hadrian's Wall from the Antonine Wall in Scotland. From this moment onwards, a series of conflicts emerged. Starting with Marcus Aurelius' reign, a series of campaigns were undertaken against the Britons, focused particularly on the coasts to prevent boat invasions (Symonds 2020: 97). New conflicts emerged again in the 170's and 180's 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, in the light of these events, the pottery supply at the site seems to be affected regarding quantities, with less reaching the site during these periods of instability.

Late 2nd Century										
Context	**NoSh**	**NoSh%**	**Weight**	**Weight%**	**MNR**	**MNR%**	**EVE**	**EVE%**	**ENVavg**	**ENVavg%**
4	1	1.4	9	1.5	0	-	-	-	1	2.0
22	15	21.1	138	22.3	5	38.5	0.24	14.9	9	18.0
30	2	2.8	17	2.7	1	7.7	0.30	1.9	2	4.0
37	1	1.4	6	1.0	-	-	-	-	1	2.0
46	5	7.0	14	2.3	-	-	-	-	3	6.0
51	5	7.0	23	3.7	-	-	-	-	2	4.0
60	6	8.5	59	9.5	-	-	-	-	1	2.0
89	2	2.8	29	4.7	1	7.7	0.10	6.2	2	4.0
169	10	14.1	173	27.9	3	23.1	1.08	67.1	9	18.0
207	12	16.9	63	10.2	2	15.4	0.05	3.1	11	22.0
210	5	7.0	57	9.2	-	-	-	-	4	8.0
215	1	9.9	8	5.2	1	7.7	0.11	6.8	5	10.0
Total	**71**	**100.0**	**620**	**100.0**	**13**	**100.0**	**1.61**	**100.0**	**50**	**100.0**

***Table 6:** Breakdown of each late 2nd century context and its associated pottery quantities.*

3rd Century

The 3rd - century produced a total of 143 sherds of Roman pottery, as exhibited in Table 7. Almost half of these fragments originate from contexts M24-102 and M24-188, accounting for 42.7% of the total quantities in this period. Mid-tier, yet significant, are contexts M24-12, M24-86 and M24-165, with a total quantity of 36.3%. The rest of the sherds are scattered across the remaining contexts in small quantities. Overall, regardless of the quantitative method employed, these contexts continue to dominate the numbers. However, M24-86 is unique as it ranks low by MNR and EVE but occupies a high position when viewed through the lens of ENVavg. This is because the rim preservation was poor, with only one rim present, but numerous body sherds originating from different individual vessels. The overall 3rd - century results indicate an increase in the number of sherds and individual vessels, as well as a rise in the number and diversity of the contexts, making the distribution of the assemblage more uniform than in the previous periods.

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 period of calm 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 (see Chapter 11.4.2), as well as an increased supply from the East Yorkshire area (Bidwell and Croom 2010). These patterns were reflected in the pottery assemblage from the Magna 2024 assemblage.

3rd Century										
Context	**NoSh**	**NoSh%**	**Weight**	**Weight%**	**MNR**	**MNR%**	**EVE**	**EVE%**	**ENVavg**	**ENVavg%**
12	18	12.6	210	12.4	5	22.7	0.51	26.0	16	16.8
72	5	3.5	96	5.7	1	4.5	0.12	6.1	4	4.2
75	2	1.4	28	1.7	-	-	-	-	1	1.1
79	1	0.7	6	0.4	0	-	-	-	1	1.1
82	1	0.7	15	0.9	0	-	-	-	1	1.1
86	17	11.9	125	7.4	1	4.5	0.20	10.2	14	14.7
95	1	0.7	3	0.2	-	-	-	-	1	1.1
96	2	1.4	10	0.6	1	4.5	0.03	1.5	2	2.1
97	2	1.4	6	0.4	1	4.5	0.07	3.6	1	1.1
102	32	22.4	182	10.7	4	18.2	0.35	17.9	9	9.5
103	1	0.7	15	0.9	0	-	-	-	1	1.1
108	12	8.4	61	3.6	-	-	-	-	6	6.3
117	1	0.7	2	0.1	0	-	-	-	1	1.1
144	2	1.4	14	0.8	-	-	-	-	1	1.1
165	17	11.8	172	10.1	4	18.2	0.24	11.7	14	14.7
188	29	20.3	750	44.2	5	22.7	0.45	23.0	22	23.2
Total	**143**	**100.0**	**1695**	**100.0**	**22**	**100.0**	**1.96**	**100.0**	**95**	**100.0**

Table 7: *Breakdown of each 3rd century context and its associated pottery quantities.*

4th Century

The 4th century produced a total of 121 sherds of Roman pottery, as exhibited in Table 8. Over three quarters of these fragments (78.5%) originated from contexts M24-59 and M24-119. The rest of the sherds were scattered across the remaining contexts in small quantities, except for M24-32, which accounted for 13.7% of the total quantities. Overall, regardless of the quantitative method employed, contexts M24-59 and M24-119 continued to dominate the results. One observation that can be made based on the values in the table below regards the rate of brokenness: while M24-119 displayed almost half of the number sherds of M24-59, when measuring the independent vessel numbers by ENV, the percentages are reversed, with M24-119 containing double the quantity of M24-59. The fragmentation rate in the latter context is higher, typical of abandoned contexts. The overall 4th century results indicate a decrease in both the pottery quantities and number of contexts, as well as a higher pottery fragmentation rate, suggesting a gradual retreat from the area.

4th Century										
Context	**NoSh**	**NoSh%**	**Weight**	**Weight%**	**MNR**	**MNR%**	**EVE**	**EVE%**	**ENVavg**	**ENVavg%**
32	16	13.7	168	12.1	1	8.3	0.32	14.5	1	2.4
50	1	0.8	6	0.4	-	-	-	-	1	2.4
59	62	51.2	444	32.0	4	33.3	1.11	50.2	10	23.8
70	2	1.7	3	0.2	-	-	-	-	1	2.4
113	1	0.8	4	0.3	-	-	-	-	1	2.4
119	33	27.3	670	48.3	7	58.3	0.73	33.0	22	52.4
124	1	0.8	1	0.1	-	-	-	-	1	2.4
146	5	4.1	92	6.6	1	7.7	0.05	2.3	5	11.9
Total	**121**	**100.0**	**1388**	**100.0**	**13**	**100.0**	**2.21**	**100.0**	**42**	**100.0**

***Table 8:** Breakdown of each 4th century context and its associated pottery quantities.*

11.3.2 QUANTITIES BY AREA

Further analysis has been undertaken regarding the link between pottery quantities and where they originated. The 2024 excavations investigated five areas: the extramural area of milecastle 46, the *vallum*, the double ditches, the northern bog area, and the well complex. An overall quantitative perspective is offered in Table 9 across all five Roman periods; depending on the quantification methods employed, results differ slightly. When weight and number of sherds are used as quantification methods, they tend to measure the different amounts of material in different pots. Thus, pots broken in more pieces will be highly represented, while the more complete ones will appear as less; similarly, if a pot weighs more (such as *amphorae* and *mortaria*), it will be better represented than the lighter vessels. It is for these reasons that weight and NoSh seem to tell slightly different stories at Magna.

According to the number of sherds, the quantities were evenly distributed across three main areas; the milecastle extramural zone, the *vallum*, and the southern military ditch. The northern bog lacked substantial quantities of bulk finds overall, while the post-medieval date of the well mound area impacted on the overall results for Roman contexts and associated Roman pottery.

The weight indicates that most of the Roman pottery originates from the extramural area of milecastle 46, followed by the military ditch and the *vallum* areas. These results, in comparison with the ENVavg results, highlight the distribution of heavier vessels such as *mortaria* and *amphorae*. The average estimated number of vessels shows that

the milecastle area held 24.8% of the pottery, while the weight indicates 45.2%. When focusing on the association of these heavy vessels within a specific area, out of a total 4554g of *mortaria* and *amphorae*, 2850g were recovered from the extramural space of the milecastle.

EVEs, MNRs and ENVs have been employed to better understand the individual numbers of vessels. When the rims alone are considered (MNR and EVE) the quantities are fairly balanced, with the military ditch producing slightly more pottery overall. When all sherds are considered (ENVavg), the ditch assemblage is by far the largest, with 40.2% of the total quantities across site. This trend however is a bulk perspective based on the total pottery quantities from the pre-Hadrianic period until the 4th century. Thus, Table 10, Table 12, Table 14, Table 16, and Table 18 below further scrutinise the changes of pottery quantity ratios across these areas in each chronological period.

Area	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
MC46	155	31.1	3870	45.2	17	26.6	1.50	21.1	74	24.8
Vallum	150	30.1	1145	13.4	14	21.9	2.03	28.6	62	20.8
Military ditch	141	28.3	2648	30.9	25	39.1	2.97	41.8	120	40.2
North bog	5	1.0	57	0.7	-	-	-	-	4	1.3
Well	48	9.6	845	9.9	8	12.5	0.61	8.6	38	12.8
Total	**499**	**100.0**	**8565**	**100.0**	**64**	**100.0**	**7.11**	**100.0**	**298**	**100.0**

***Table 9:** The total quantities of Roman pottery as distributed across the five diagnostic areas[1].*

Extramural area of milecastle 46

The distribution of pottery quantities across the five Roman periods in the extramural area of milecastle 46 has been displayed in Table 10. The number of sherds and the weight indicate the pre-Hadrianic period as the most abundant in pottery quantities. MNR, EVE and ENVavg all designate different periods as the most quantitative: late 2nd century, 3rd century, and early 2nd century respectively. All periods will be further investigated below.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	55	35.5	2676	69.1	2	11.8	0.23	15.3	17	23.0
Early 2nd c.	31	20.0	550	14.2	3	17.6	0.17	11.3	21	28.4
Late 2nd c.	35	22.6	266	6.9	6	35.3	0.27	18.0	19	25.7
3rd c.	18	11.6	210	5.4	5	29.4	0.51	34.0	16	21.6
4th c.	16	10.3	168	4.3	1	5.9	0.32	21.3	1	1.4
Total	**155**	**100.0**	**3870**	**100.0**	**17**	**100.0**	**1.50**	**100.0**	**74**	**100.0**

***Table 10:** The distribution of pottery quantities across the five Roman periods in the extramural area of milecastle 46.*

[1] The total quantities here include one stone pot lid weighing 55 grams. This has been taken into consideration with the overall quantities as it was used with the vessels and thus an important element of this category, despite differing in material.

Table 11 provides a detailed overview of the pottery from the extramural area of milecastle 46. In the pre-Hadrianic period, context M24-3 yielded the highest number of sherds and estimated vessels, while context M24-18 produced the greatest weight, though this derived from a single *amphora*. In the early 2nd century CE, the highest pottery quantities originated from M24-44, the deliberate fill of a ditch which likely resulted from a single deposition episode and material was gathered from around the site. In contrast, in the later 2nd century, the most pottery-rich context was M24-22, a stone box drain, where pottery probably accumulated gradually as water transported it across the site. Examining pottery quantities in relation to their depositional contexts not only clarifies the reasons behind higher concentrations but also distinguishes between single-event deposition and gradual accumulation over time.

In the 3rd and 4th centuries, only one context from each period contained Roman pottery. While pottery quantities suggest the 3rd century deposit remained open for some time, the 4th century context was likely filled in a single, deliberate episode. Further analysis of fabrics and form types is necessary to determine whether the sherds originate from a single chronological phase or represent material accumulated over time. This assessment will be addressed in the following sections, where fabrics and forms are examined in detail.

Pre-Hadrianic						
Context number	Context type	Pottery				
		NoSh	Weight	MNR	EVE	ENVavg
3	Fill of E-W ditch M24-2.	34	228	2	0.23	11
18	Fill of a pit M24-17.	16	2205	-	-	1
27	Fill of an Iron Age enclosure ditch M24-26.	4	34	-	-	4
33	Ditch terminus.	1	1	-	-	1
54	Lower fill of ditch M24-43.	1	290	-	-	1
Total		**55**	**2676**	**2**	**0.23**	**17**
Early 2nd Century						
14	Upper fill at E end of ditch M24-26.	7	78	-	-	5
15	E-W path outside MC46.	5	78	-	-	4
21	Deliberate fill of pit M24-9.	2	2	-	-	1
44	Deliberate fill of ditch M24-43.	17	392	3	0.17	11
Total		**31**	**550**	**3**	**0.17**	**21**
Late 2nd Century						
4	Spread of cobbles S of MC46.	1	9	-	-	1
22	Stone box drain.	15	138	5	0.24	9
30	Small patch of cobbled surface.	2	17	1	0.03	2
37	NW-SE cobbled road.	1	6	-	-	1
46	Deliberate upper fill of M24-45.	5	14	-	-	3
51	Lower fill of M24-45.	5	23	-	-	2
60	Lower fill of M24-11-silting process.	6	59	-	-	1
Total		**35**	**266**	**6**	**0.27**	**19**
3rd Century						
12	Upper fill of ditch M24-11.	18	210	5	0.51	16
Total		**18**	**210**	**5**	**0.51**	**16**
4th Century						
32	Deliberate fill of gully M24-36.	16	168	1	0.32	1
Total		**16**	**168**	**1**	**0.32**	**1**

Table 11: *The distribution of pottery quantities across periods and contexts in the extramural area of milecastle 46.*

Vallum Area

The distribution of pottery quantities across the five Roman periods in the *vallum* area has been displayed in Table 12. All quantitative perspectives indicate that the 3rd century assemblage was the most abundant from this area, except for EVE, where the 4th century results are higher than the 3rd century ones by 16.8%. All periods will be further investigated below by context, to better understand the way these quantities were distributed.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	3	2.0	92	8.0	-	-	-	-	3	4.8
Early 2nd c.	2	1.3	18	1.6	1	7.1	0.50	2.5	2	3.2
Late 2nd c.	2	1.3	29	2.5	1	7.1	0.10	4.9	2	3.2
3rd c.	77	51.3	549	47.9	8	57.1	0.77	37.9	42	67.7
4th c.	66	44.0	457	39.9	4	28.6	1.11	54.7	13	21.0
Total	**150**	**100.0**	**1145**	**100.0**	**14**	**100.0**	**2.03**	**100.0**	**62**	**100.0**

Table 12: *The distribution of pottery quantities across the five Roman periods in the* vallum *area.*

Table 13 provides a detailed overview of contexts and their associated pottery quantities in the *vallum* area. The 2nd century contexts correspond to various elements of the frontier system, including the clay foundation of the northern *vallum* mound and the Military Way, though pottery quantities remain minimal. This scarcity may reflect reduced activity due to the shift to the Antonine Wall and subsequent instability during the reigns of Marcus Aurelius, Commodus, and Septimius Severus, followed by a more stable 3rd century (see Symonds 2020: 97–108 for conflicts on the Wall from the Antonine return to the 3rd century).

The majority of *vallum* area pottery comes from 3rd and some 4th century contexts. M24-82, M24-96, M24-103, and M24-117, are linked to the cremation cemetery on the northern *vallum* mound and contain only small quantities of pottery. The reduced and inconsistent presence of these sherds are likely a result of depositional processes involved in moving the ash from the pyre to the cremation deposit rather than deliberate placement. This situation is further supported by M24-102 and M24-86, two ditches associated with the cremations and likely used to dispose of the remaining ashes and pottery that was used throughout the funerary rite.

From the 4th century, M24-59 contained the most pottery. This was the secondary fill of ditch M24-58 which had two-phases of infilling: the 3rd century M24-72, an open-silted accumulation, and M24-59, a deliberate one-time deposit. While the first fill helps to understand the ditch's period of exposure, the second provides a snapshot of pottery consumption at the site in the 4th century, determining the exact pottery types and fabrics employed by the communities there.

Pre-Hadrianic						
Context number	Context type	Pottery				
		NoSh	Weight	MNR	EVE	ENVavg
65	Fill of pit M24-64.	2	10	-	-	2
Total		**2**	**10**	**-**	**-**	**2**
Early 2nd Century						
73	Clay foundation of N *vallum* mound.	2	18	1	5	2
Total		**2**	**18**	**1**	**5**	**2**
Late 2nd Century						
89	The Military Way.	2	29	1	10	2
Total		**2**	**29**	**1**	**10**	**2**
3rd Century						
72	Primary fill of ditch M24-58 through silting.	5	96	1	0.12	4
75	Fill of gully M24-74 through silting.	2	28	-	-	1
79	Fill of gully M24-78- through silting.	1	6	-	-	1
82	Burnt deposit in fill of ditch M24-80.	1	15	-	-	1
86	Fill of ditch M24-85 through silting. In the cremation area.	17	125	1	0.20	14
95	Fill of pit M24-94.	1	3	-	-	1
96	Spread of cremated material from M24-83.	2	10	1	0.03	2
97	Upper fill of gully M24-80.	2	6	1	0.07	1
102	Upper fill of M24-101, through silting.	32	182	4	0.35	9
103	Cremation MSK3.	1	15	-	-	1
108	Silt layer N of N mound-downslope washed material.	12	61	-	-	6
117	Cremation MSK4.	1	2	-	-	1
Total		**77**	**549**	**8**	**0.77**	**42**
4th Century						
50	Secondary fill of well M24-52.	1	6	-	-	1
59	Deliberate secondary fill of ditch M24-58.	62	444	4	1.11	10
70	Fill of gully M24-69 through silting.	2	3	-	-	1
113	Deposit of large rubble cut into the *vallum's* N mound.	1	4	-	-	1
Total		**66**	**457**	**4**	**1.11**	**13**

Table 13: *The distribution of pottery quantities across periods and contexts in the* vallum *area.*

Double Ditches

Table 14 displays the distribution of pottery quantities across the five Roman periods in the double ditches area. Sherd count and weight indicate that the early 2nd and 4th centuries produced the most substantial assemblages. However, regarding the number of individual vessels, the highest quantities are divided between the 4th century, the late 2nd century, and early 2nd century, depending on whether only rims or all sherds are considered. A contextual analysis of each period follows to clarify the patterns of distribution and deposition.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	28	19.9	769	29.0	6	24.0	0.47	15.8	28	23.3
Early 2nd c.	45	31.9	757	28.6	4	16.0	0.41	13.8	40	33.3
Late 2nd c.	10	7.1	173	6.5	3	12.0	1.08	36.4	9	7.5
3rd c.	16	13.5	186	7.0	4	16.0	0.23	7.7	15	12.5
4th c.	39	27.7	763	28.8	8	32.0	0.78	26.3	28	23.3
Total	**141**	**100.0**	**2648**	**100.0**	**25**	**100.0**	**2.97**	**100.0**	**120**	**100.0**

Table 14: *The distribution of pottery quantities across the five Roman periods in the southern ditches.*

Table 15 provides a detailed overview of contexts and their associated pottery quantities in the fort ditch area. Two context themes can be distinguished from this table: the four fills of ditch M24-127 (in chronological order: M24-141, M24-133, M24-132 and M24-128) and the pyre and its associated contexts (144, 146, 150, 169, and 165/177). The ditch was likely part of an early Roman fort or annexe, which was used for an extended period before its final backfilling (See Chapter 2.3.4). The high pottery quantities, along with the silting is some of these deposits, indicate that the ditch had been used as a dumping area over time, providing an excellent overview on pottery consumption throughout the Roman period, which in turn reveals information on the distribution, supply, and demand patterns at the site.

The pyre and its related contexts display significant pottery quantities which contrast with the cremation deposits that did not contain any intentionally placed goods. These higher quantities provide evidence that ceramic offerings were part of the funerary customs and that they continued to play a role for at least some of the life of the pyre, as some sherds date to the mid- to late 3rd century. Analysing pottery quantities from these contexts provides evidence for the cultural traditions of the community around Magna throughout Roman times, such as the funerary habits and use of offerings.

Pre-Hadrianic						
Context number	Context type	Pottery				
		NoSh	Weight	MNR	EVE	ENVavg
133	Secondary fill of ditch M24-127.	23	696	5	0.43	23
141	Primary fill of military ditch M24-127, through silting.	4	66	1	0.04	4
Total		**27**	**762**	**6**	**0.47**	**27**
Early 2nd Century						
128	Intentional uppermost fill of ditch M24-127.	10	164	-	-	7
132	Tertiary fill of ditch M24-127.	25	487	3	0.24	23
148	Intentional fill of ditch M24-147.	3	14	-	-	3
150	Ditch cut for the pyre M24-165.	6	75	1	0.17	6
174	Fill of ditch M24-173.	1	17	-	-	1
Total		**45**	**757**	**4**	**0.41**	**40**
Late 2nd Century						
169	Clay platform containing cremations.	10	173	3	1.08	9
Total		**10**	**173**	**3**	**1.08**	**9**
3rd Century						
144	Uppermost layer of ash/charcoal from the S end of pyre M24-177. Same as M24-165.	2	14	-	-	1
165/177	Pyre.	17	172	-	0.23	14
Total		**19**	**186**	**-**	**0.23**	**15**
4th Century						
119	Subsoil between S *vallum* mound and military ditch M24-127.	33	670	7	73	22
124	Cobbled road surface between M24-120 and M24-127.	1	1	-	-	1
146	Fill of ditch M24-150, surrounding/ covering pyre M24-177.	5	92	1	5	5
Total		**39**	**763**	**8**	**78**	**28**

Table 15: *The distribution of pottery quantities across periods and contexts in the southern ditch area.*

Northern Bog Area

Table 16 provides a detailed overview of contexts and their associated pottery quantities in the northern bog trench. The only chronological period to produce Roman pottery is the late 2nd century, with five sherds weighing 57g and originating from four average estimated number of vessels. Table 17 provides an in-depth look at the precise context from which the pottery originated, M24-210. The low quantity of pottery from a single context indicates the lack of extensive Roman activity in this part of the site.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	-	-	-	-	-	-	-	-	-	-
Early 2nd c.	-	-	-	-	-	-	-	-	-	-
Late 2nd c.	5	100.0	57	100.0	-	-	-	-	4	100.0
3rd c.	-	-	-	-	-	-	-	-	-	-
4th c.	-	-	-	-	-	-	-	-	-	-
Total	**5**	**100.0**	**57**	**100.0**	**-**	**-**	**-**	**-**	**4**	**100.0**

Table 16: *The distribution of pottery quantities across the five Roman periods in the northern bog area.*

Late 2nd Century						
Context number	Context type	Pottery				
		NoSh	Weight	MNR	EVE	ENVavg
210	Fill of prehistoric ditch M24-208. Furthest extent of the bog.	5	57	-	-	4
Total		**5**	**57**	**-**	**-**	**4**

Table 17: *The distribution of pottery quantities across periods and contexts in the northern bog area.*

Well Area

Table 18 provides a detailed overview of contexts and their associated pottery quantities in the well area. Only two of the five Roman periods have been represented through pottery due to the predominantly post-medieval character of the area. Table 19 displays the precise contexts from which pottery originated and their associated quantities. Like the northern bog area, the Roman activity in this area is less consistent than in the other trenches. Nonetheless, the results indicate some activity in the late 2nd century, where two contemporary contexts provided consistent levels of pottery.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	-	-	-	-	-	-	-	-	-	-
Early 2nd c.	-	-	-	-	-	-	-	-	-	-
Late 2nd c.	19	39.6	95	11.2	3	37.5	0.16	26.2	16	42.1
3rd c.	29	60.4	750	88.8	5	62.5	0.45	73.8	22	57.9
4th c.	-	-	-	-	-	-	-	-	-	-
Total	**48**	**100.0**	**845**	**100.0**	**8**	**100.0**	**0.61**	**100.0**	**38**	**100.0**

Table 18: *The distribution of pottery quantities across the five Roman periods in the well area.*

Late 2nd Century						
Context number	Context type	Pottery				
		NoSh	Weight	MNR	EVE	ENVavg
207	Roman peat layer.	12	63	2	0.05	11
215	Roman peat layer.	7	32	1	0.11	5
Total		**19**	**95**	**3**	**0.16**	**16**
3rd Century						
188	Roman peat layer.	29	750	5	0.45	22
Total		**29**	**750**	**5**	**0.45**	**22**

Table 19: *The distribution of pottery quantities across periods and contexts in the well area.*

11.4 FABRIC SUPPLY

The following section analyses the fabric supply at the site over time. The overview relies predominantly on the broad nine fabric classes. The individual fabrics have been further scrutinised as part of the selective case-studies discussed in-depth in Chapter 11.5. Additionally, in this section, the early 2nd century period has been combined with the late 2nd century period, to create a clearer image of the ways pottery fabrics changed from the pre-Hadrianic period, to end of the 2nd century and then into the 3rd and 4th centuries CE.

Table 20 shows the overall fabric class quantities from the pre-Hadrianic period until the end of 4th century CE, expressed in percentages of NoSh, weight, MNR, EVE, ENVavg. All quantification methods point towards the black-burnished ware class (B) as the most prominent throughout time, except for weight where *amphorae* are dominant at 41.1% because of their heavy character. However, based on the numbers below, the top fabrics to be uncovered throughout the 2024 excavations were the black-burnished ware vessels (B), followed by the reduced ones (R). These numbers and percentages are further divided by areas and periods within each fabric section, to understand how fabric consumption changed at the site over time and space.

Fabric Class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
A	31	6.2	3501	41.1	-	-	-	-	14	4.7
B	175	35.1	1342	15.8	34	54.0	2.87	47.0	98	33.0
F	57	11.4	288	3.4	3	4.8	0.43	7.0	28	9.4
G	48	9.6	482	5.7	9	14.3	1.47	24.1	14	4.7
M	23	4.6	1053	12.4	6	9.5	0.61	10.0	15	5.1
O	24	4.8	171	2.0	1	1.6	0.05	0.8	22	7.4
R	76	15.3	1259	14.8	5	7.9	0.47	7.7	58	19.5
S	64	12.9	414	4.9	5	7.9	0.21	3.4	48	16.2
Total	**498**	**100.0**	**8510**	**100.0**	**63**	**100.0**	**6.11**	**100.0**	**297**	**100.0**

Table 20: *Fabric class quantities recovered during M24 excavations from Roman contexts.*

11.4.1 CLASS A- *AMPHORAE*

The first fabric class to be analysed is A- *amphorae*. Table 21 shows the way their consumption changed from the pre-Hadrianic period until the end of the 4th century CE. Most *amphorae* are associated with the pre-Hadrianic period and the 2nd century, amounting to almost three quarters of the total quantities. All sherds, except for one miscellaneous *amphora* fragment, are from Dressel 20 *amphorae* used for transporting mainly olive oil. Conversely, in the 3rd and 4th centuries, the quantities decrease. This overall pattern likely reflects the demand for supplies during two key phases: the initial Roman military arrival before the construction of Hadrian's Wall, and the later reoccupation of the frontier following withdrawal from the Antonine Wall. Both instances correspond to a sudden influx of personnel requiring provisions, whereas the more stable 3rd and 4th centuries suggest a steady but reduced supply of *amphorae*, a shift in the occupational or functional role of the site or possibly a change in the transporting containers.

Period	NoSh	NoSh%	Weight	Weight%	ENVavg	ENVavg%
Pre-Hadrianic	18	58.1	2577	73.6	3	21.4
2nd c.	9	6.2	218	6.2	7	50.0
3rd c.	1	29.1	514	14.7	2	14.3
4th c.	3	9.7	192	5.5	2	14.3

***Table 21:** The consumption of* amphora *fabrics across the Roman periods.*

11.4.2 CLASS B- BLACK-BURNISHED

The black-burnished ware class includes both the original fabrics from southwest (BB1) and southeast (BB2) England, as well as the imitations made in black-burnished ware style. Table 22 indicates that their consumption (ENVavg) starts from 9.2% in the pre-Hadrianic period and rises to almost 50% throughout the 3rd century CE, before decreasing again in the 4th century. These trends seem to reflect the general supply of black-burnished ware over time in northern Britain as described by Gillam (1976: 57) and further observed by Bidwell and Croom (2010).

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	20	11.4	164	12.2	4	11.8	0.28	9.8	9	9.2
2nd c.	43	24.6	265	19.8	10	29.4	0.65	22.6	30	30.6
3rd c.	69	39.4	534	39.8	15	39.8	1.27	44.3	48	49.0
4th c.	43	24.6	379	28.2	5	28.2	0.67	23.3	11	11.2

***Table 22:** The consumption of black-burnished ware quantities across the Roman periods.*

Table 23 below displays the contexts from which the black-burnished ware originated. In the pre-Hadrianic period, most of black-burnished ware came from M24-3 and M24-133. While the former is part of a potential marching camp, the latter is an early Roman military ditch associated with a fort annexe. The former had a more ephemeral, short-term occupational style, whereas the latter was associated with a more permanent inhabitancy. However, the black-burnished ware quantities are low regardless of the status of the originating context. This further supports the previously recognised black-burnished ware supply pattern which had not started formally yet in northern Britain before the 120s CE. Instead, these vessels are likely personal possessions brought with the soldiers upon their arrival, marking the beginning of a future supply market.

Fabric ENVavg		
Period/Context	**B**	**B%**
Pre-Hadrianic	**9**	**9.2**
3	3	3.1
27	1	1.0
133	4	4.1
141	1	1.0
2nd Century	**30**	**30.6**
14	1	1.0
15	1	1.0
44	3	3.1
73	1	1.0
128	1	1.0
132	3	3.1
150	4	4.1
22	2	2.0
30	1	1.0
37	1	1.0
46	1	1.0
51	2	2.0
169	1	4.1
207	4	2.0
210	2	2.0
215	2	2.0
3rd Century	**48**	**49.0**
12	9	9.2
72	1	1.0
75	1	1.0
79	1	1.0
82	1	1.0
86	5	5.1
95	1	1.0
96	2	2.0
97	1	1.0
102	6	6.1
103	1	1.0
108	2	2.0
117	1	1.0
165	6	6.1
188	10	10.2
4th Century	**11**	**11.2**
59	1	1.0
119	9	9.2
146	1	1.0
Grand Total	**98**	**100.0**

Table 23: *The distribution of black-burnished ware across periods and contexts.*

Table 24 looks at the different form classes made in black-burnished ware fabrics. Out of the total ENVavg percentage of black-burnished ware vessels, 61.2% were jars, 9.2% dishes, 8.2% bowls and 14.3% either a dish or a bowl. Approximately 7.1% were unidentified vessels. Overall, cooking pots were predominant, whereas the other black-burnished ware vessel forms appear to have been consumed in lower quantities. While this is an overall perspective across all periods, the predominance of jars is still relevant to the nature of occupation in this area. The associated contexts are predominantly linked to smaller structures such as the milecastle or the marching camp, or even industrial areas. These environments are not associated with long-term occupation, and this is likely to have affected the range of pottery forms arriving at the site. It will be particularly useful to compare the patterns of use at milecastle 46 with the data from within the fort at Magna as it becomes available during the project. This will hopefully shed light on the link between pottery form consumption and the length of occupancy in different military installations, particularly whether two sites in close proximity could develop drastically different consumption styles.

Form class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Bowl	15	8.6	111	8.3	6	17.6	0.24	8.4	8	8.2
Dish	19	10.9	132	10.1	8	23.5	0.38	13.2	9	9.2
Bowl/dish	16	9.1	155	11.5	-	-	-	-	14	14.3
Jar	118	67.4	913	68.0	20	58.8	2.25	58.8	60	61.2
Unidentified	7	4.0	28	2.1	-	-	-	-	7	7.1

***Table 24:** Black-burnished ware form class analysis across the Roman periods.*

11.4.3 CLASS F- COLOUR-COATED AND FINEWARES

In total, 57 sherds of fineware have been identified during the 2024 excavation season, which represent an ENVavg of 28 (Table 25). Of this, over half of the quantity originates in 2nd and 3rd century contexts. Table 26 shows that they were dispersed in a wide range of contexts, but in low quantities of either one or two sherds per context. Only a few contexts were more significant in each period. In the pre-Hadrianic period, M24-3 and M24-27 are both associated with a possible marching camp and contained the majority of fineware pottery in this chronological phase.

Conversely, the finewares from the 2nd century seem to be dispersed across the site with single sherds found in various ditch deposits. Only a stone box drain, M24-22, contained two sherds from two different beakers. A similar situation to the 2nd century can be observed in the consequent period. All 3rd century contexts contained only one or two vessels, except for M24-86, which comprised four vessels. They are associated with a ditch adjacent to the northern cluster of cremation burials. This suggests that finewares might have been part of the funerary rituals and, after serving their purpose, they may have been discarded in this ditch.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	13	22.8	26	9.0	1	33.3	0.18	41.9	5	17.9
2nd c.	17	29.8	78	27.0	-	-	-	-	10	35.7
3rd c.	20	35.1	59	20.5	2	66.7	0.25	58.1	9	32.1
4th c.	7	12.3	125	43.4	-	-	-	-	4	14.3

***Table 25:** The consumption of finewares quantities across the Roman periods.*

Sum of ENVavg	Fabric	
Period/Context	F	F%
Pre-Hadrianic	5	17.9
3	2	7.1
27	1	3.6
33	1	3.6
133	1	3.6
2nd Century	10	35.7
21	1	3.6
44	1	3.6
132	1	3.6
22	2	7.1
46	1	3.6
60	1	3.6
89	1	3.6
169	1	3.6
215	1	3.6
3rd Century	9	32.1
12	1	3.6
86	4	14.3
102	1	3.6
108	1	3.6
188	2	7.1
4th Century	4	14.3
59	2	7.1
119	1	3.6
124	1	3.6
Grand Total	28	100.0

Table 26: *The distribution of finewares across periods and contexts.*

Table 27 explores the diversity of form classes within the fineware category. As observed, beakers represent the majority, with 75.0% of the total ENVavg. However, two bowls and a castor box (see Gillam 341) have also been identified at the site. The latter comes from M24-59, which was the roadside drainage ditch for the Military Way. Interestingly, one of the bowls comes from a ditch adjacent to the northern group of cremation burials. This may suggest that the cremation-related pottery included a wider range than found anywhere else on the site.

Form class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Beaker	36	63.2	133	46.2	3	100.0	0.43	100.0	21	75.0
Bowl	15	26.3	139	48.3	-	-	-	-	2	7.1
Castor box	1	1.8	6	2.1	-	-	-	-	1	3.6
Unidentified	5	8.8	10	3.5	-	-	-	-	4	14.3

***Table 27:** Finewares form class analysis across the Roman periods overall.*

11.4.4 CLASS G- GRITTED WARES

Within the gritted ware class (G), 48 sherds have been analysed, which come from 14 average estimated number of vessels (Table 28). Out of the total number of sherds, 77.1% come from the 4th century context. However, when analysing the number of individual vessels by ENVavg, half of the quantities come from the 2nd century contexts, whilst 35.7% originate from 4th century deposits. At first glance, this is a rather unusual pattern, since the gritted wares tend to be associated with the late Roman period. However, when focusing on the more precise fabrics from this category, the gritted wares from the earlier periods tend to be quartz-gritted, almost like very coarse greyware, whereas the 4th century material is dominated by organic-gritted wares, particularly calcite-gritted ware. The latter is typical of the late Roman period, emerging in high quantities on the Wall from the late 4th century onwards (Bidwell and Croom 2010: 29).

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	1	2.1	19	3.9	-	-	-	-	1	7.1
2nd c.	9	18.8	112	23.2	5	55.5	0.33	23.5	7	50.0
3rd c.	1	2.1	6	1.2	-	-	-	-	1	7.1
4th c.	37	77.1	345	71.6	9	44.4	1.14	77.6	5	35.7

***Table 28:** The consumption of gritted ware quantities across the Roman periods.*

11.4.5 CLASS M- *MORTARIA*

In total, 23 sherds of *mortaria* were recovered in 2024, amounting to an average estimated number of vessels of 15. Table 29 displays the distribution of *mortaria* quantities across time. It appears that these vessels were consumed the most in the pre-Hadrianic period and throughout the 2nd century CE, whereas the 3rd and 4th centuries show reduced evidence for their supply. This is like the pattern observed in *amphora*. It is interesting to note that both are 'specialised' vessels, meaning they cater towards very specific functions, and they both arrive at the site in the first periods of its Roman occupation.

The overlapping and similar patterns of *amphorae* and *mortaria* distribution may be linked to the functions of the area or the supply needs of the communities at the time. At the beginning of Roman occupation, supplies were needed in higher quantities as the communities were freshly posted in an unknown area. In the 2nd century the return from the Antonine Wall meant that there was

another need to re-supply the area. However, in the 3rd and 4th centuries, the function of the milecastle as well as its surrounding area may have been altered. In the 3rd and 4th centuries CE, some milecastles assumed the function of regulating trade (Symonds 2020: 84). This has already been identified as a likely role for milecastle 46 (Frame *et al.* 2024: 10), therefore a change in the pottery repertoire away from specialised forms to a more typical subsistence assemblage is unsurprising.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	6	26.1	432	41.0	2	33.3	0.20	32.8	4	26.7
2nd c.	9	39.1	302	28.7	2	33.4	0.08	13.1	7	46.7
3rd c.	4	17.4	161	15.3	1	16.7	0.17	27.9	2	13.3
4th c.	4	17.4	158	15.0	1	16.7	0.16	26.2	2	13.3

***Table 29:** The consumption of* mortaria *quantities across the Roman periods.*

Table 30 offers an in-depth perspective of *mortaria* consumption distribution at the site. In the pre-Hadrianic period, most of it came from M24-133, which was the secondary fill of an early military ditch, containing discarded objects from the associated fort annexe. In the 2nd - century, *mortaria* were scattered around the site, with no clear association other than the same ditch mentioned above (M24-132 and M24-128). It appears that *mortaria* are more closely linked to the defensive ditch than any other contexts, showing that this vessel class was used consistently at the fort annexe until the end of the 2nd century CE.

Sum of ENVavg	Fabric	
Period/Context	**M**	**M%**
Pre-Hadrianic	**4**	**26.7**
3	1	6.7
133	3	20.0
2nd Century	**7**	**46.7**
44	1	6.7
128	1	6.7
132	2	13.3
22	1	6.7
46	1	6.7
207	1	6.7
3rd Century	**2**	**13.3**
12	1	6.7
188	1	6.7
4th Century	**2**	**13.3**
59	1	6.7
119	1	6.7
Grand Total	**15**	**100.0**

***Table 30:** The distribution of* mortaria *across periods and contexts.*

11.4.6 CLASS O- OXIDISED WARES

A total of 23 sherds of oxidised wares were recovered during the 2024 excavation season, the equivalent of 22 ENVavg (Table 31). Only four vessels have been identified in terms of form, of which all were flagons (Table 32). Overall, the oxidised fabrics were rather friable, resulting in very fragmented and abraded sherds. Nonetheless, the identified flagons add another layer to the consumption at the site, that is alcohol use. Flagons seem to be more orientated towards the consumption of wine as opposed to beer (Pitts 2005: 58). They come as a 'pair' to the beakers already discussed at the site (see Chapter 11.4.3). One beaker came from the pre-Hadrianic period, specifically from the possible marching camp (M24-3). The Hadrianic period beakers came mostly from the contexts associated with the fort annexe. In the 3rd century, one of the flagons came from M24-86, a ditch associated with the cemetery. Overall, it seems that flagons are part of the 'basic' kit, as well as an important utensil for ritual activities at the site.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	9	37.5	45	26.3	-	-	-	-	8	36.4
2nd c.	3	12.5	33	19.3	-	-	-	-	3	13.6
3rd c.	6	25.0	72	42.1	1	100.0	0.05	100.0	6	27.3
4th c.	6	25.0	21	12.3	-	-	-	-	5	22.7

***Table 31:** The consumption of oxidised ware quantities across the Roman periods.*

Form class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Flagon	5	20.8	59	34.5	1	100.0	0.05	100.0	4	18.2
Unidentified	19	79.2	112	65.5	-	-	-	-	18	81.8

***Table 32:** Oxidised wares form class analysis across the Roman periods.*

11.4.7 CLASS R- REDUCED WARES

Reduced wares represented the second most popular fabric class consumed at the site over time after black-burnished ware. Table 33 shows the distribution of reduced ware consumption from the pre-Hadrianic time until the latest Roman occupation of the area. Consumption of this fabric class peaks particularly in the pre-Hadrianic and 2nd century CE. This is likely due to the supply systems at the time. Before the Hadrianic period, no formal supply existed in the area, and instead the soldiers would bring pottery with them, along with a potter who would operate a military kiln. It is likely that this practice continued until the end of the 2nd century CE, when the black-burnished ware products started arriving on the market en masse, filling the gaps left by the reduced wares.

Table 34 outlines the main form classes made in reduced wares. Based on ENVavg, excluding the unidentified forms, jars represented the most frequent form at 18.1%, followed by bowls and dishes at a significantly lower rate. The consumption therefore seemed to focus on cooking utensils rather than tablewares. In the pre-Hadrianic and Hadrianic periods, most of the jars originated from the southern defensive ditch associated with an early fort or annexe. In the 3rd century, the reduced sherds were associated with a wider range of contexts, spread across the excavated areas and indicating that this fabric class continued to be used at the site, albeit in smaller quantities.

11.4.8 CLASS S- SAMIAN

In total, 76 sherds of Samian were recovered from Magna across the four periods, equivalent to 48 vessels (ENVavg). Table 35 shows the consumption of Samian at Magna over time and the quantities indicate it follows a typical distribution curve although there are a few unique traits. A model of general Samian consumption has been theorised by Millett (1987). The supply of Samian to a region is initiated by the arrival of the Roman army; the supply then becomes more established as they settle and the community grows, peaking in the 2nd century. After this, the production and supply

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	9	11.8	234	18.6	-	-	-	-	9	15.5
2nd c.	29	38.1	639	50.7	2	40.0	0.15	31.9	26	44.9
3rd c.	27	35.5	263	20.9	1	20.0	0.12	25.5	17	29.3
4th c.	11	14.5	123	9.8	2	40.0	0.20	42.6	6	10.3

Table 33: *The consumption of reduced ware quantities across the Roman periods.*

Form class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Mini-jar	1	0.9	17	1.1	1	10.0	0.15	15.8	1	1.2
Bowl	3	2.7	87	5.8	3	30.0	0.23	24.2	3	3.6
Bowl/dish	1	0.9	109	7.3	-	-	-	-	1	1.2
Flagon	1	0.9	19	1.3	-	-	-	-	1	1.2
Jar	24	21.2	425	28.4	6	60.0	0.57	60.0	15	18.1
Unidentified	83	73.5	841	56.1	-	-	-	-	62	74.7

Table 34: *Reduced wares form class analysis across the Roman periods.*

of Samian declines and therefore, the quantities decrease and become residual, including broken or lost vessels. At Magna this can be seen in the low quantities of Samian in the pre-Hadrianic period (15.5%), followed by a sudden increase to 44.9% in the 2nd century. However, the expected rapid drop off in Samian pottery after this is absent at Magna, with 23.4% of the sherds dating to the 3rd century.

The high rate of consumption even in the 3rd century may be due to the continued supply of Samian, albeit in lower quantities. When the Central Gaulish Samian workshops stopped the supply during the 2nd century, Eastern Gaulish products took over from workshops in places such as Trier and Rheinzabern (Willis 2005). The latter especially was supplied to Hadrian's wall at Carlisle, Birdoswald, Vindolanda, and South Shields (Dickinson 1991; Dickinson 1997; Pengelly 1985; Hartley and Dickinson 1994). Additionally, unlike other pottery types, Samian had a prolonged life due to its careful curation, use and repair, resulting in higher quantities of residual material (Willis 2005). The Magna Samian assemblage fits into this image, following the typical distribution model but slightly skewed when it comes to residuality.

In terms of the diversity of form types, it appears that Magna received a wide range of products. Table 36 displays the main Samian forms to arrive at the site, which included beakers, bowls, *mortaria*, cups and dishes. These form types suggest that supply was up-to-date and constantly catering to the trending fashions. A clear example of this is the existence of the two dish types, Dr18 and Dr18/31. These are part of a wider evolving range which started with Dr18 (mid-late 1st century), before moving to Dr31 (mid 2nd century) and then Dr31R (post c. 160 CE) as the final versions in this sequence (Willis 2005). This example alone is a clear indicator that Magna regularly received trending Samian products. This is expected, especially at a military site, which tended to receive constant, fresh supplies of Samian, resulting in 'up-to-date' assemblages (Willis 1998: 104).

Nonetheless, the Samian assemblage from Magna consists of small sherds, often abraded, resulting in a high number of unidentified forms which amount to 64.6% ENVavg. Due to these factors, it is difficult to explore the functional role and chronology in more depth.

Period	NoSh	NoSh%	Wt	Wt%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Pre-Hadrianic	10	15.6	40	9.7	1	20.0	0.04	19.0	9	18.8
2nd c.	29	45.4	243	58.7	1	20.0	0.03	14.3	22	45.9
3rd c.	15	23.4	86	20.8	2	40.0	0.1	47.6	10	20.8
4th c.	10	15.6	45	10.9	1	20.0	0.04	19.9	7	14.6

Table 35: The consumption of Samian ware quantities across the Roman periods.

Form class	Form type	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Beaker	**68**	1	1.6	4	1.0	-	-	-	-	1	2.1
	Unident.	1	1.6	1	0.2	-	-	-	-	1	2.1
Bowl	**Dr37**	2	3.1	36	8.7	-	-	-	-	1	2.1
	Dr30	1	1.6	8	1.9	-	-	-	-	1	2.1
	Unident.	4	6.3	42	10.1	-	-	-	-	4	8.3
Bowl/ *mortarium*	**Curle21**	1	1.6	6	1.4	-	-	-	-	1	2.1
Cup	**Dr33a**	1	1.6	1	0.2	1	20.0	0.03	14.3	1	2.1
Dish	**Dr18/31**	2	3.2	40	9.6	-	-	-	-	2	4.2
	Dr18	1	1.6	4	1.0	1	20.0	0.04	19.0	1	2.1
	Unident.	4	6.3	38	9.2	3	60.0	0.14	66.7	3	6.3
Mortarium	**Unident.**	1	1.6	26	6.3	-	-	-	-	1	2.1
Unidentified	**Unident.**	45	70.3	208	50.2	-	-	-	-	31	64.6

Table 36: Samian form class analysis across the Roman periods.

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

The following section focuses on exploring the pottery patterns in connection to their social and chronological contexts. Two case studies will be explored here. Firstly, there is an opportunity to study pottery consumption under short-term occupation versus long-term habitation in the pre-Hadrianic period, due to the possible marching camp and the uncovering of the military ditch associated with the potential fort annexe.

The second case study will consider the pottery assemblages associated with milecastle 46 in comparison to the contexts associated with the military ditch and its associated fort annexe. The two have different occupational patterns: the milecastle is associated with short-term accommodation and shift-based occupation, while the fort to the south is for long-term amenities. Comparing the two contexts will provide preliminary evidence for different pottery consumption styles, which can then be further explored in future seasons, when the excavations move more into the fort and its associated features.

11.5.1 CASE-STUDY 1. EXPLORING THE PRE-HADRIANIC PERIOD AT THE SITE: TEMPORARY MARCHING CAMP AND PERMANENT FORT.

This section analyses the pottery consumption in the pre-Hadrianic period at Magna. Two key settlements will be used as case studies: a possible

temporary marching camp and an annexe of the early fort. Roman activity has been identified outside the southeast corner of the milecastle, which predates the actual construction of the milecastle (see Chapter 2.1.4). The activity consisted of a military ditch (M24-2) and several large pits (M24-9, M24-17, M24-56 and M24-91). These features likely comprise a temporary marching camp and the contexts and deposits associated with these features will be scrutinised as part of this analysis.

Pre-Hadrianic activity has also been identified south of the *vallum*, likely associated with a fort annexe (see Chapter 2.3.4). A series of shallow gullies appear to have been the foundations for the walls of a timber building. This potential building was located south of a defensive ditch (M24-127) associated with the fort and therefore having a long-term occupational character. Its associated pre-Hadrianic fills (M24-133 and M24-141) likely contained the rubbish discarded from the fort and can thus provide an insight to the pottery used at the site. This provides an ideal counter perspective to the material from the potential temporary marching camp located southeast of the milecastle.

11.5.1.1 FABRICS

This section discusses the fabric class consumption at the two case studies. The first to be analysed is the material from the temporary marching camp. Table 37 outlines the contexts containing pottery, to understand whether any residual or intrusive pottery could potentially infiltrate into the database and skew the results. It appears that only context 18 may contain residual and intrusive pottery, due to its gradual deposition over time. However, considering that only one *amphora* originated from this context, the results are not impacted. From the more abundant contexts, M24-27 represents the deliberate backfill of an Iron Age ditch during the Roman arrival, meaning that it will contain pottery from the pre-Hadrianic period. One residual fragment of gritted ware that likely dates to the Late Iron Age period was recovered from this deposit; it was likely deposited during the backfilling process. Overall, contexts are reliable to analyse the pottery consumption in the marching camp as a case study.

Context	Context description	Fabric class	ENVavg	ENVavg%
3	Upper fill of M24-2 ditch, deliberate backfill. Part of a later cobbled surface has slumped down the south side of the ditch.	A	1	5.9
		B	3	17.6
		F	2	11.8
		M	1	5.9
		O	1	5.9
		S	3	17.6
18	Primary fill of pit M24-17 as result of deposition over time.	A	1	5.9
27	Secondary fill of ditch M24-26. Intentional backfilling of a LIA ditch.	B	1	5.9
		F	1	5.9
		G	1	5.9
		R	1	5.9
33	Eastern terminus of a ditch going under the milecastle.	F	1	5.9

Table 37: *Fabric class distribution across the contexts associated with the temporary marching camp.*

Switching to the military ditch associated with the fort annexe, it appears that the relevant contexts are equally reliable. They have been further explored in Table 38 to understand their viability and the risk of highly residual or intrusive pottery. The contexts in consideration are a series of fills within the military ditch. The most relevant are M24-141, M24-133 and M24-132. While the first two are pre-Hadrianic, the last one is dated to the 2nd century. The pre-Hadrianic dating is supported by the pottery and the two contexts are sealed by the overlying deposits, making the material reliable for the case-study in this section. However, M24-132 may have started in the Hadrianic period, but because the ditch was open for a long period of time, the chronological diversity of the pottery runs until the 4th century. The deposit contained: a Curle 21 Samian *mortarium*-type bowl which could only date to the mid-2nd century CE at the earliest; early Hadrianic-Antonine straight-rimmed Black Burnish cooking pots; later 2nd - and 3rd century CE everted-rimmed Black Burnish jars; and lastly, a hammerhead *mortarium*, which could date to 290 CE at the earliest and 370 CE at the latest (see type Gillam 281). Therefore, the pottery from this context suggests a continuous use of the ditch which filled over time with discarded broken pots and other finds such as shoes. Regardless, the other two pre-Hadrianic contexts are sealed and reliable to analyse the pottery consumption in the fort as a case study.

Context	Context description	Fabric class	ENVavg	ENVavg%
133	Secondary anaerobic fill of ditch M24-127. Frequent finds, suggesting dumping of rubbish in this ditch.	**B**	4	14.8
		F	1	3.7
		M	3	11.1
		O	5	18.5
		R	5	18.5
		S	5	18.5
141	Primary anaerobic fill of ditch M24-127. Formed over a period of time.	**B**	1	3.7
		0	1	3.7
		R	1	3.7
		S	1	3.7

***Table 38**: Fabric class distribution across the contexts associated with the military ditch.*

The fabric class distribution at the marching camp has been explored in Table 39. In total, 55 sherds were recovered from an average of 17 vessels. Of these quantities, the black-burnished ware and the finewares dominated at 23.5%, followed by Samian with 17.6% and *amphorae* at 11.8%. It is interesting to notice that almost every fabric class is represented at the marching camp. This shows that those living there attempted to be self-sufficient. However occupation was only short-term as the low pottery quantities suggest.

The quantity and diversity of pottery suggest a short-term occupation likely tied to a specific purpose, such as a reconnaissance survey assessing the terrain's suitability for occupation. This activity may date to at least c. 85 CE, coinciding with the foundation of Magna fort. However, the proximity of the potential camp to the fort raises the question of its necessity. One possibility is that the camp represents the movement of forces within an already conquered territory (Jones 2009: 68), enabling troops to cover a wider area, assert control, and manage the landscape more effectively. Alternatively, the camp may have played a role in the construction of Hadrian's Wall and milecastle 46, similar to temporary camps identified along the Antonine Wall, which facilitated its construction (Hanson and Maxwell 1983: 171–121; Jones 2009: 63).

The presence of most fabric classes at the marching camp indicates that while pottery quantities were

Fabric Class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
A	17	30.9	2287	92.7	-	-	-	-	2	11.8
B	15	27.3	87	3.5	1	50.0	0.05	21.7	4	23.5
F	12	21.8	25	1.0	1	50.0	0.18	78.3	4	23.5
G	1	1.8	19	0.8	-	-	-	-	1	5.9
M	3	5.5	14	0.6	-	-	-	-	1	5.9
O	2	3.6	13	0.5	-	-	-	-	1	5.9
R	1	1.8	9	0.4	-	-	-	-	1	5.9
S	4	7.3	14	0.6	-	-	-	-	3	17.6
Total	**55**	**100.0**	**2468**	**100.0**	**2**	**100.0**	**0.23**	**100.0**	**17**	**100.0**

Table 39: *Fabric class consumption associated with the pre-Hadrianic marching camp.*

small, they included a wide range of wares. This pattern likely reflects the newness of the military presence in the area. Given that this region was largely aceramic (Harding 2004: 24), soldiers would have needed to bring their own pottery and possibly produce some locally in military kilns. The assemblage suggests that they primarily relied on imported wares, such as Samian, finewares, and black-burnished ware, which were brought with them upon arrival. For greater pottery diversity or larger quantities, they may have returned to the fort, where supplies were more readily available.

In light of these results, the analysis will switch now to the material from the military ditch. The fabric class ratios have been exhibited in Table 40. In total 27 sherds were collected from an average of 27 vessels. Their distribution is balanced, with at least one sherd representative of each fabric class. The oxidised, reduced, and Samian wares are the most abundant categories, followed by the black-burnished ware, *mortaria* and, least abundant, finewares. Considering that this ditch has been used for discarding rubbish, the diversity of material likely shows the breadth of the fabric classes consumed within the fort in the pre-Hadrianic period.

Fabric Class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
B	5	18.5	77	10.1	3	50.0	0.23	48.9	5	18.5
F	1	3.7	1	0.1	-	-	-	-	1	3.7
M	3	11.1	418	54.9	2	33.3	0.20	42.6	3	11.1
O	6	22.2	27	3.5	-	-	-	-	6	22.2
R	6	22.2	213	28.0	-	-	-	-	6	22.2
S	6	22.2	26	3.4	1	16.7	0.04	8.5	6	22.2
Total	**27**	**100.0**	**762**	**100.0**	**6**	**100.0**	**0.47**	**100.0**	**27**	**100.0**

Table 40: *Fabric class consumption associated with the pre-Hadrianic military ditch.*

There is a clear difference in the consumption of greywares and oxidised wares in the ditch contexts (Table 40) versus the temporary marching camp (Table 39). The former contained noticeably higher quantities of these fabric classes, while the latter focused mostly on the black-burnished wares and finewares. This may be related to the permanent against temporary nature of the two sites and the extent to which this influenced pottery production, supply and consumption. The ditch is associated with more permanent occupation, meaning that long-term use of the landscape may encourage activities otherwise non-existent at short-term encampments, such as pottery production.

In pre-Hadrianic Roman Britain, pottery production was driven by the military upon their arrival in an area. The armies would arrive with potters, and they would install a workshop to start producing pottery to satisfy the military demand. This was particularly necessary when arriving in aceramic areas or areas with little local pottery which was deemed unsuitable. Therefore, upon the military arrival at Magna in the pre-Hadrianic period, the soldiers likely brought potters with them who would have been able to provide the needed pottery. This resulted in an array of fabrics, each associated with its specific military workshop and created a less formal supply system with less homogenous, recognisable fabrics. The high presence of miscellaneous reduced and oxidised wares predominantly in the ditch associated with the fort annexe indicates that more permanent activities took place here, such as pottery manufacture. By contrast, the use of primarily recognisable fabrics at the temporary camp 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.

11.5.1.2 FORM CLASSES AND FORM TYPES

In light of the fabric results, this section will now focus on the form classes present in the two areas, in order to further explore the link between demand and pottery supply within the two settlements. Table 41 explores the consumption of form classes at the temporary marching camp. Two categories prevailed within these deposits, beakers and jars. These two vessel form classes are associated with the most basic needs of eating, cooking and drinking. These staple vessels were therefore essential to soldiers when living in a temporary camp.

Table 42 further displays the link between fabric classes and the morphological forms at the temporary camp. It appears that jars were predominantly supplied and consumed in black-burnished ware fabrics, while beakers were made in fine colour-coated fabrics. Within the unidentified category, Samian emerges as the predominant fabric with 17.6%. Considering that vessels made from this fabric tended to be predominantly tablewares such as bowls and dishes, they likely completed the suite of required vessels for daily life, alongside the beakers and jars. Therefore, the pottery form classes indicate a basic yet complete lifestyle, with a diversity of vessels sufficient to satisfy all the soldiers' basic needs.

In short, the temporary marching camp seems to be self-sufficient due to the wide array of vessel classes being consumed. This is particularly evident in comparison with the assemblage from the milecastle, which showed a predominant consumption of black-burnished ware jars, but reduced quantities of beakers or food serving vessels (Crizbasan forthcoming). The two assemblages indicate that while both structures were used for short-term tasks, the milecastle had a long-term function, meaning that for the short-term occupants only their basic requirements needed to be fulfilled, as they could return to the nearby fort for more complex duties. Conversely, the temporary marching camp was used for short-term tasks with a short-term function and, therefore, unlike the milecastle, it needed to be more self-sufficient to fulfil the tasks and move on afterwards. These differences in function affected the pottery consumption, especially when it came to the diversity of form classes and supported needs.

Form class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Amphora	17	30.9	2287	92.7	-	-	-	-	2	11.8
Beaker	12	21.8	25	1.0	1	50.0	0.18	78.3	4	23.5
Dish	2	3.6	10	0.4	1	50.0	0.05	21.7	1	5.9
Flagon	2	3.6	13	0.5	-	-	-	-	1	5.9
Jar	14	25.5	96	3.9	-	-	-	-	4	23.5
Mortarium	3	5.5	14	0.6	-	-	-	-	1	5.9
Unidentified	5	9.1	23	0.9	-	-	-	-	4	23.5
Total	**55**	**100.0**	**2468**	**100.0**	**2**	**100.0**	**0.23**	**100.0**	**17**	**100.0**

Table 41: *Form class consumption associated with the pre-Hadrianic marching camp.*

Form class	Fabric class	ENVavg	ENVavg%
Amphora	A	2	11.8
Beaker	F	4	23.5
Dish	B	1	5.9
Flagon	O	1	5.9
Jar	B	3	17.6
	G	1	5.9
Mortarium	M	1	5.9
Unidentified	R	1	5.9
	S	3	17.6

Table 42: *Distribution of form classes across fabric classes in the pre-Hadrianic marching camp.*

In light of this self-sufficient character of the marching camp, one would expect a similar image from the defensive ditch's assemblage, since the pottery from these deposits was associated with a permanent base which, like the camp, was also self-sufficient. Table 43 shows the ratios of form classes from the ditch. At first glance jars and *mortaria* are the most prominent categories. However, 63% of the total ENVavg were difficult to identify. Table 44 scrutinises the distribution of form classes across fabric classes. The unidentified vessels are made in oxidised, reduced and Samian ware. Samian is typically associated with tablewares, while the oxidised wares tend to be used for either tablewares or flagons. Reduced wares are generally associated either with bowls or jars. Therefore, based on this knowledge, it is clear that there was a wide diversity of vessels within the fort.

Form class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Bowl	1	3.7	8	1.0	-	-	-	-	1	3.7
Bowl/dish	1	3.7	5	0.7	-	-	-	-	1	3.7
Dish	1	3.7	4	0.5	1	16.7	0.04	8.5	1	3.7
Jar	4	14.8	72	9.4	3	50.0	0.23	48.9	4	14.8
Mortarium	3	11.1	418	54.9	2	33.3	0.2	42.6	3	11.1
Unidentified	17	63.0	255	33.5	-	-	-	-	17	63.0
Total	**27**	**100.0**	**762**	**100.0**	**6**	**100.0**	**47**	**100.0**	**27**	**100.0**

Table 43: *Form class consumption associated with the pre-Hadrianic defensive ditch.*

Form class	Fabric class	ENVavg	ENVavg%
Bowl	**S**	1	3.7
Bowl/dish	**B**	1	3.7
Dish	**S**	1	3.7
Jar	**B**	4	14.8
Mortarium	**M**	3	11.1
Unidentified	**F**	1	3.7
	O	6	22.2
	R	6	22.2
	S	4	14.8

Table 44: *Distribution of form classes across fabric classes in the pre-Hadrianic defensive ditch.*

Overall, the pottery assemblages from the temporary marching camp and the defensive ditch are simultaneously very similar and very different, depending on the angle of analysis. When fabric class is employed, the permanent character of the fort emerges through the prevalence of miscellaneous reduced and oxidised fabrics, which likely came from a local military kiln. Conversely, the fabric consumption from the marching camp consisted of the more popular fabrics, such as black-burnished wares and Samian, which began to slowly supply this part of the Empire. Therefore, it almost looks as if the two installations had two separate supply lines, with the camp focused on the more popular and accessible fabrics, whereas the fort could afford to be more self-sufficient by producing its own pottery.

However, when the form class analysis is applied, the two installations seem to consume similar pottery. This is because they were both self-sufficient settlements and thus, they needed a wide variety of pottery including jars, beakers, bowls and dishes. The only difference is that while one was short-lived, the other was more permanent. Otherwise, they had the same needs and therefore demanded the same pottery form classes to fulfil them.

11.5.2 CASE STUDY 2. EXPLORING THE SHORT-TERM AND LONG-TERM AT THE SITE: MILECASTLE AND FORT.

This section analyses the pottery consumption between the 2nd century through to the 4th century CE at Magna. Two particular areas of the excavation have been selected as case studies: milecastle 46 and the southern military ditch. The pottery recovered from the milecastle in 2023 and 2024 will

be combined to provide a full perspective on what consumption looked like there. The contemporary pottery assemblage from the military ditch to the south will be considered as a counter perspective to the milecastle. Due to its link to the fort, the pottery in its fills is therefore associated with a permanent base and can provide a perspective on the fort consumption patterns. This will determine whether pottery consumption differed in the two areas and whether this is linked to their long-term/short-term use.

11.5.2.1 FABRICS

This section discusses the fabric class consumption at the two case-studies. The first to be analysed is the material from milecastle 46. Table 45 shows the quantities of all fabric classes. When it comes to quantifying the individual vessels, the MNR and EVE designate the B class as the most prominent, while the ENVavg indicates the B and R classes are the most abundant, with similar quantities. Considering further the ENVavg numbers, other notable quantities were Samian at 11.5%, oxidised and finewares at 8.7%, gritted wares at 5.5% and *mortaria* at 4.4%. Therefore, at first glance, it appears that every pottery fabric class is consumed at the milecastle, displaying a varied supply.

In light of this apparent diversity, it is important to understand that this is an overall perspective, and that the quantities may differ when focusing on specific periods. The most relevant example of this is the S class, the Samian. Table 45 displays Samian as a rather abundant category (ENVavg). However, when focusing on its distribution across periods, the perspective changes significantly (Table 46). Out of the total quantity (100%), 52.4% originated from 3rd and 4th century contexts, where it was likely residual. The actual quantities of Samian at the milecastle are rather low and focused particularly in the Hadrianic period, at the beginning of the 2nd century. This suggests that Samian was being supplied at the beginning of the milecastle's occupation but then this started to decrease and eventually it became residual.

Fabric Class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
A	102	24.3	2152	36.0	-	-	-	-	7	3.8
B	132	32.0	1206	20.2	17	38.6	1.45	34.1	51	27.9
F	26	6.2	115	1.9	2	4.5	0.13	3.1	16	8.7
G	27	6.4	337	5.6	7	15.9	0.87	20.5	10	5.5
M	10	2.4	649	10.9	4	9.1	0.35	8.2	8	4.4
O	22	5.3	120	2.0	2	4.5	0.19	4.5	16	8.7
R	68	16.2	1130	18.9	9	20.5	1.05	24.7	53	29.0
S	29	6.9	256	4.3	3	6.8	0.21	4.9	21	11.5
Total	**419**	**100.0**	**5979**	**100.0**	**44**	**100.0**	**4.25**	**100.0**	**183**	**100.0**

Table 45: *Fabric class consumption at milecastle 46.*

Period	ENVavg% Samian
Hadrianic	28.6
Late 2nd Century	19.0
3rd Century	38.1
4th Century	14.3

Table 46: *The distribution of Samian across periods at milecastle 46.*

When switching to examine the fabric class consumption in the defensive ditch associated with the fort, the results are somewhat different from the milecastle. Black-burnished wares do not dominate the results anymore and instead reduced and Samian wares are consumed in higher quantities. *Mortaria* and *amphorae* are also represented in higher quantities. In short, the results displayed in Table 47 display a different picture from the milecastle, seen in the different distribution of the fabric class ratios, especially the reduced, black-burnished and Samian wares. Therefore, these three categories will be further explored chronologically across each period.

Fabric Class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
A	2	5.7	83	12.7	-	-	-	-	2	6.7
B	5	14.3	53	8.1	1	33.3	0.16	66.7	4	13.3
F	1	2.9	1	0.2	-	-	-	-	1	3.3
M	3	8.6	44	6.8	1	33.3	0.05	20.8	3	10.0
O	2	5.7	26	4.0	-	-	-	-	2	6.7
R	12	34.3	371	57.0	-	-	-	-	10	33.3
S	10	28.6	73	11.2	1	33.3	0.03	12.5	8	26.7
Total	**35**	**100.0**	**651**	**100.0**	**3**	**100.0**	**24**	**100.0**	**30**	**100.0**

Table 47: *Fabric class consumption from the military ditch associated with the fort annexe.*

Table 48 displays these three fabric classes from the Hadrianic period through to the 4th century, in the military ditch fills. Generally, the late 2nd century is sparse in quantities, displaying low percentages across all three fabrics. Firstly, the black-burnished wares were consumed the most consistently throughout time. Their main competition in the Hadrianic period were the reduced wares, which were made in particularly high quantities but then dropped considerably in the following periods. Similarly, Samian was consumed at high percentages in the Hadrianic period but became residual by the beginning of the 3rd century. Considering that the assemblage from these deposits is only a small sample of what consumption would have looked like in the fort, there are biases and partial perspectives to these results. Nonetheless, they highlight that, especially at the beginning of the 2nd century CE, the fort was consuming high quantities of reduced and Samian ware, and less of the black-burnished ware, which is the reverse picture of the milecastle assemblage patterns.

Fabric ENVavg%			
Period	**B (100%)**	**R (100%)**	**S (100%)**
Hadrianic	32.0	59.1	43.5
Late 2nd Century	4.0	9.1	8.7
3rd Century	24.0	13.6	17.4
4th Century	40.0	18.2	30.4

Table 48: *The distribution of B, R and S fabric classes across the periods in the military ditch fills.*

11.5.2.2 FORM CLASSES AND FORM TYPES

Next, the distribution of form classes and types has been explored at the milecastle and the defensive ditch respectively. The former has been exhibited in Table 49. When assessing the individual vessels by ENVavg, jars are the most prominent at 25.7%, while the other form classes are all under 10%. Unfortunately, 41.5% of the vessels remain unidentified. When analysing the quantities from the perspective of MNR, however, only 2.3% of the vessels were unidentified. Using this category, jars represented 54.5% of the total assemblage, followed by dishes at 11.4%, *mortaria* at 9.1%, bowls at 6.8%, and drinking-associated vessels (beakers and flagons) at 9%. In short, jars represent the main morphological form to make its way at the milecastle, while the other categories are almost trivial.

The distribution of these form classes across fabrics has been explored in Table 50. Jars were predominantly made in black-burnished ware fabrics, followed by reduced and gritted wares. Bowls and dishes were also predominantly made in black-burnished wares, and less in Samian wares. Samian forms could not be identified to a high extent, due to their residual nature which resulted in abraded sherds that were difficult to assign to specific types. Overall, these results highlight once again the importance of jars, particularly those made in black-burnished ware fabrics, defining this as the main feature of pottery consumption at the milecastle.

Form Class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Amphora	102	24.3	2152	36.0	-	-	-	-	7	3.8
Beaker	23	5.5	112	1.9	2	4.5	0.13	3.1	14	7.7
Bowl	7	1.7	135	2.3	3	6.8	0.18	4.2	6	3.3
Bowl/dish	12	2.9	98	1.6	-	-	-	-	9	4.9
Bowl/jar	1	0.2	15	0.3	1	2.3	0.06	1.4	1	0.5
Cup	2	0.5	15	0.3	2	4.5	0.15	3.5	2	1.1
Dish	15	3.6	100	1.7	5	11.4	0.21	4.9	6	3.3
Flagon	9	2.1	67	1.1	2	4.5	0.19	4.5	6	3.3
Jar	140	33.4	2025	33.9	24	54.5	2.98	70.1	47	25.7
Mortarium	11	2.6	675	11.3	4	9.1	0.35	8.2	9	4.9
Unidentified	97	23.2	585	9.8	1	2.3	-	-	76	41.5
Total	**419**	**100.0**	**5979**	**100.0**	**44**	**100.0**	**4.25**	**100.0**	**183**	**100.0**

***Table 49:** Form class consumption at milecastle 46.*

Form class	Fabric class	ENVavg	ENVavg%
Amphora	A	7	3.8
Beaker	F	14	7.7
Bowl	B	3	1.6
	S	3	1.6
Bowl/dish	B	9	4.9
Bowl/jar	G	1	0.5
Cup	S	2	1.1
Dish	B	5	2.7
	S	1	0.5
Flagon	O	4	2.2
	R	1	0.5
	W	1	0.5
Jar	B	24	13.1
	G	7	3.8
	R	16	8.7
Mortarium	M	8	4.4
	S	1	0.5
Unidentified	B	10	5.5
	F	2	1.1
	G	2	1.1
	O	12	6.6
	R	36	19.7
	S	14	7.7

Table 50: *Distribution of form classes across fabric classes at milecastle 46.*

Looking at the defensive ditch deposits, Table 51 displays the form class consumption overall. Similarly to the milecastle assemblage, 40% of the sherds could not be identified. Of those recognised, the majority were jars (16.7%), followed by *amphorae*, beakers, bowls and dishes at similar quantities (6.7%). While the jars are the highest in individual quantities, the ratios between the form classes are evidently more balanced than at the milecastle. Considering that these deposits represent the rubbish discarded in the ditch, they represent a small fraction of all the consumed vessels at the fort, but they certainly indicate consumption based on a wider variety of forms.

The distribution of these form classes has been further explored in Table 52. The jars are made in almost equal quantities of both black-burnished and reduced wares. Additionally, more forms are seen in Samian: beakers, *mortaria*, cups and dishes. These features are all suggestive of a diverse consumption style, fulfilled by a regularly updated supply chain as well as possible local production.

Form Class	NoSh	NoSh%	Weight	Weight%	MNR	MNR%	EVE	EVE%	ENVavg	ENVavg%
Amphora	2	5.7	83	12.7	-	-	-	-	2	6.7
Beaker	2	5.7	5	0.8	-	-	-	-	2	6.7
Bowl/dish	2	5.7	115	17.7	-	-	-	-	2	6.7
Bowl/ *mortarium*	1	2.9	6	0.9	-	-	-	-	1	3.3
Cup	1	2.9	1	0.2	1	33.3	0.03	12.5	1	3.3
Dish	2	5.7	40	6.1	-	-	-	-	2	6.7
Jar	6	17.1	237	36.4	1	33.3	0.16	66.7	5	16.7
Mortarium	3	8.6	44	6.8	1	33.3	0.05	20.8	3	10.0
Unidentified	16	45.7	120	18.4	-	-	-	-	12	40.0
Total	**35**	**100.0**	**651**	**100.0**	**3**	**100.0**	**0.24**	**100.0**	**30**	**100.0**

Table 51: *Form class consumption from the military ditch associated with the fort annexe.*

Form class	Fabric class	ENVavg	ENVavg%
Amphora	A	2	6.7
Beaker	F	1	3.3
	S	1	3.3
Bowl/dish	B	1	3.3
	R	1	3.3
Bowl/*mortarium*	S	1	3.3
Cup	S	1	3.3
Dish	S	2	6.7
Jar	B	3	10.0
	R	2	6.7
Mortarium	M	3	10.0
Unidentified	O	2	6.7
	R	7	23.3
	S	3	10.0

Table 52: *Distribution of form classes across fabric classes in the military ditch.*

Overall, the pottery assemblages from the milecastle and the military ditch contain both similarities and differences. When fabric analysis is employed, the permanent character of the fort emerges through the prevalence of miscellaneous reduced fabrics, which likely came from a local military kiln. Conversely, the fabric consumption at milecastle 46 consisted of the more popular fabrics, particularly black-burnished wares. Though consumption patterns for both areas displayed diversity in the fabric classes used, when it comes to their quantities there are clear differences. It appears that they both used the same supply line for pottery, however the vessels brought to the milecastle catered towards a more short-term living style, based on black-burnished ware jars. Conversely, the more permanent nature

of the occupation associated with the military ditch extended its fabric and form class consumption, including miscellaneous fabrics which were likely locally made and a wider diversity of forms beyond jars. In short, the pottery consumption provides a perspective on the different consumption styles based on the social context of an assemblage, providing promising preliminary results for the following years when the excavation will move into the SW quadrant of the fort.

11.6 CONCLUSIONS AND FURTHER WORK

The pottery assemblage from 2024 excavation season at Magna reveals key aspects of both consumption and supply from the pre-Hadrianic period through to the 4th century. Qualitatively, all the analysed assemblages from the possible pre-Hadrianic marching camp, the military ditch of the potential fort annexe, and the milecastle and its surroundings show that a wide diversity of fabrics arrived at the site. This demonstrates that this section of the frontier was well-connected to varied supply lines which covered the needs of the soldiers stationed in the area.

However, when quantitative analysis has been employed, new results emerge regarding consumption patterns at the milecastle, marching camp and the deposits associated with the fort. While the former showed a consumption style based on black-burnished ware jars, the latter two indicated higher vessel diversity although in different categories. This can 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. The marching camp showed more diversity in form classes but displayed reduced diversity in fabrics, which tended to be the more widely circulating black-burnished, Samian or finewares, likely as a result of its short-lived occupation. Lastly, the fort produced a wide diversity of both fabric and form classes, 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 military ditch. The small area excavated and the nature of the contexts – which likely accumulated over time through discarding the unused pottery and other objects – mean that it is merely a glimpse into a more extensive and diverse consumption culture. Nonetheless, this small sample has already confirmed indeed the existing difference between the temporary and permanent installations in the area regarding their vessel supply.

Such preliminary results offer scope for further research in regard to pottery consumption at the fort. The pottery recovered during the upcoming excavations of Magna fort will offer an excellent comparison for the already complete milecastle assemblage recovered in the 2023 and 2024 excavation seasons (Crizbasan forthcoming). The two perspectives will form a comparative study regarding the supply of pottery to Magna and the surrounding area. Further study will also determine if the milecastle assemblage was a series of 'selected' vessels from the fort that would cover the short-term needs for the solders on shift. Understanding how these two occupational areas behaved, especially considering their proximity to each other, will shed light on the daily lives of the soldiers.

Additionally, the understanding of pottery consumption could benefit from lipid analysis. While the pottery assemblages may reveal two consumption styles at the fort and the milecastle, it is important to ask whether the consumed food was also different. It is impossible to know which foods would have been cooked or consumed in these vessels without further scientific analysis, including lipid analysis. The residues preserved within the ceramic containers could provide answers to questions regarding diet, food storage, trade, and use. While the use and function of a vessel can only be assumed based on the broad form class, individual communities may have given secondary uses to their pots.

12. BULK FINDS

DR CRISTINA CRIZBASAN

A total of 2318 individual bulk finds were recorded during the 2024 excavations, with a combined weight of 55428 grams. This included pottery, bone, teeth, metal, ceramic building material, glass, coal and clay pipes (displayed in the tables below by excavation area). 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. In addition to the pottery analysis (see Chapter 11), samples of coal from secure Roman contexts have been sent to Ian Jackson for analysis as part of his research into the use and supply of coal on the Roman frontier in Britain.

Due to the low quantities of animal bone recovered during the 2023 and 2024 excavations, archaeozoological analysis will be undertaken after the completion of the 2025 excavation. This will allow the full assemblage from outside the fort to be assessed together and provide a more useful comparison to the material from within the fort.

Category	Count	Weight (in g.)
Samian	26	205
Amphora	23	3545
Mortaria	11	414
Other pottery	169	1513
Bone	2	13
Teeth	1	1
CBM	25	2207
Iron	30	392
Slag	10	90
Glass	11	26
Coal	1	3
Medieval/ post-med pottery	12	252
Clay pipe	5	14
Total	**326**	**8675**

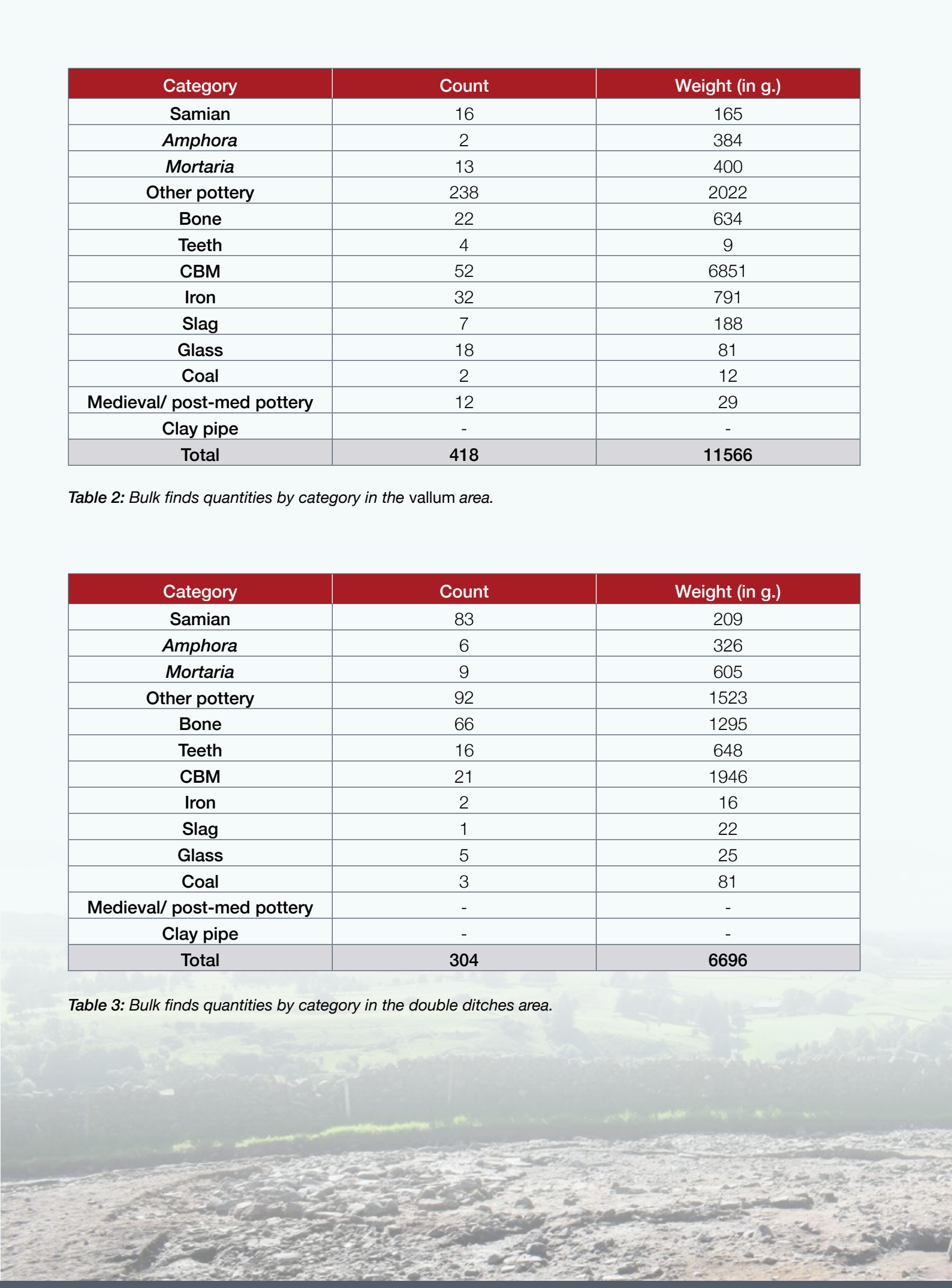
Table 1: *Bulk finds quantities by category in the extramural area of milecastle 46.*

Category	Count	Weight (in g.)
Samian	16	165
Amphora	2	384
Mortaria	13	400
Other pottery	238	2022
Bone	22	634
Teeth	4	9
CBM	52	6851
Iron	32	791
Slag	7	188
Glass	18	81
Coal	2	12
Medieval/ post-med pottery	12	29
Clay pipe	-	-
Total	**418**	**11566**

Table 2: *Bulk finds quantities by category in the* vallum *area.*

Category	Count	Weight (in g.)
Samian	83	209
Amphora	6	326
Mortaria	9	605
Other pottery	92	1523
Bone	66	1295
Teeth	16	648
CBM	21	1946
Iron	2	16
Slag	1	22
Glass	5	25
Coal	3	81
Medieval/ post-med pottery	-	-
Clay pipe	-	-
Total	**304**	**6696**

Table 3: *Bulk finds quantities by category in the double ditches area.*

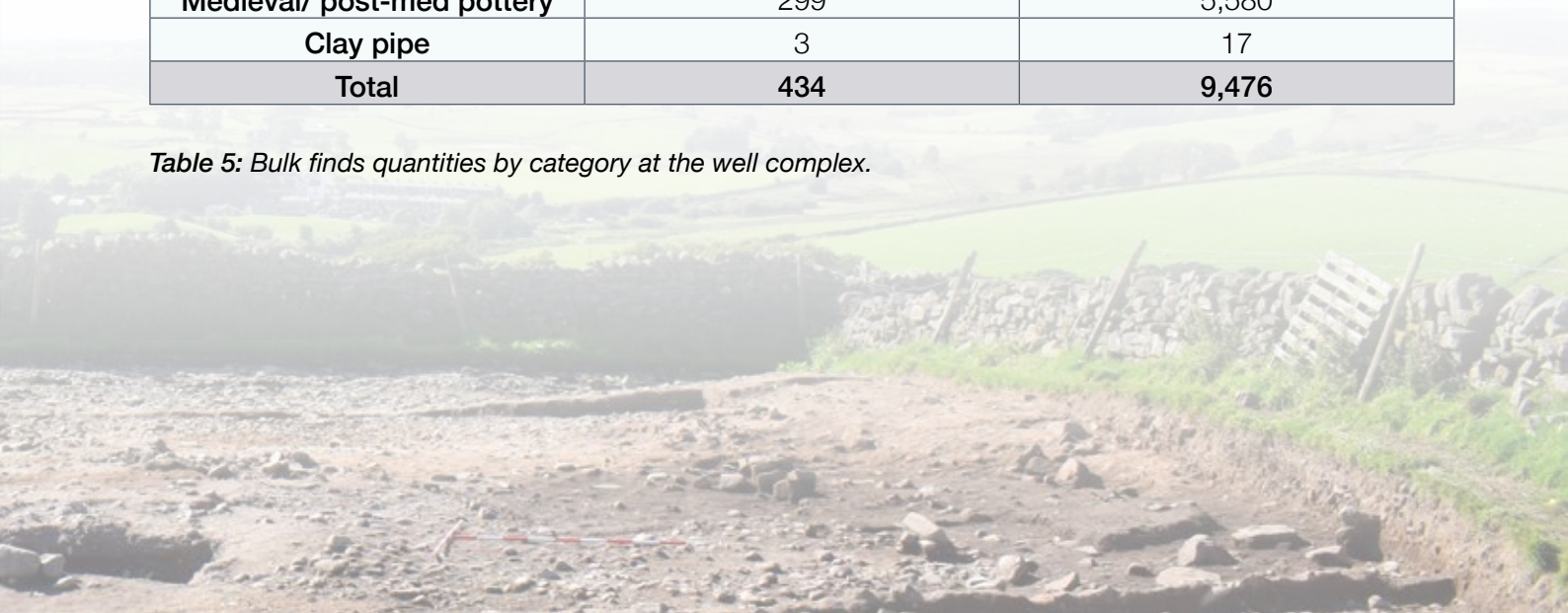


Category	Count	Weight (in g.)
Samian	1	3
Amphora	2	41
Mortaria	-	-
Other pottery	2	9
Bone	-	-
Teeth	-	-
CBM	5	1,461
Iron	1	3
Slag	-	-
Glass	6	116
Coal	-	-
Medieval/ post-med pottery	12	77
Clay pipe	-	-
Total	**29**	**1710**

Table 4: *Bulk finds quantities by category in the northern bog area.*

Category	Count	Weight (in g.)
Samian	4	34
Amphora	5	345
Mortaria	2	114
Other pottery	12	156
Bone	3	1
Teeth	-	-
CBM	8	2,041
Iron	24	648
Slag	6	232
Glass	56	235
Coal	11	73
Medieval/ post-med pottery	299	5,580
Clay pipe	3	17
Total	**434**	**9,476**

Table 5: *Bulk finds quantities by category at the well complex.*



13. FUTURE RESEARCH

RACHEL FRAME

The Magna project continues groundbreaking collaboration with numerous researchers around the world to study the archaeological and environmental material being recovered from the excavations. Examination of the human remains, including stable isotope analysis of samples from the cremation burials, is ongoing with Dr Trudi Buck, Dr Joanna Moore and Professor Janet Montgomery at Durham University. It is hoped this will reveal further details about the origin of the individuals buried on the frontier at Magna and why they were interred away from the main cemetery. The leather assemblage from the 2024 excavations is being used to study the impacts of conservation techniques on archaeological leather by Dr Elizabeth Greene (University of Western Ontario), Dr Gillian Taylor (Teesside University), and Barbara Birley (Vindolanda Trust). Several techniques including FTIR, SEM and metric analysis have been carried out on the assemblage both before and after conservation to record potential shrinkage and changes in the chemical structure of the leather. The conservation of the wooden planks recovered during the excavation is ongoing in the Vindolanda Trust's lab and, once complete, the methodology used in the process will be published by the Trust's curator, Barbara Birley.

As the project moves to its next stage with the excavation of the fort ditches to the immediate north of the last fort built at the site, it will get closer to the concentration of occupation at the site. This may well provide a very different set of results to compare to the first two years of the project. It is also likely that the work will encounter more evidence for the earliest Roman military presence in the landscape and the first of the pre-Hadrianic forts. It may be the case that some of those remains are preserved in waterlogged or anaerobic conditions and, if so, this information will be vital in feeding into the future management strategy for the preservation of the Magna landscape.

14. CONCLUSION

DR ANDREW BIRLEY

The 2024 excavations at Magna produced a wealth of information about the use of the site from the Iron Age to the modern periods with stunning and unexpected results from the Roman occupation of the frontier, not least the discovery of a hitherto unknown cremation cemetery at the site. While the analysis of the cremation remains is ongoing, the preliminary results discussed in this report show that the memorialising of this military landscape into a space which included a place for the departed was a tradition which started in the early 2nd century and continued for almost three centuries. Although only 11 individuals were encountered in the 2024 excavations, it is likely that this small number represents only a fraction of the true scale of this activity.

The environmental data from the excavations revealed that the surrounding fields, in the later Iron Age and early Roman periods, had been used to either grow or process barely. The continuation of this practice into the Roman occupation suggests that the Roman army and its agents managed to maintain the local agricultural practices despite the heavy build-up of military presence and infrastructure that the pre-Hadrianic forts and Hadrian's Wall represented.

Water and its management were constant themes of 2024, both for the modern excavators and the ancient people who used the Magna landscape. The location of the Iron Age settlement on the hillside was made possible by the preservation of a series of extensive boundary ditches. The pre-Hadrianic Roman military ditch to the south of this settlement had either intentionally or inadvertently been used to further drain this part of the site. The cutting of the *vallum* presented another opportunity to manage water at scale, although this feature was routed to avoid earlier works and the wettest areas of the site. Despite those impressive engineering works, the need to further manage excess water remained throughout the Roman period and a series of drainage ditches and channels were cut to link the Military Way and boundary of the cemetery to the *vallum*. Elsewhere, in the landscape surrounding the post-medieval well, there was potential evidence of the Romans using the wet landscape to their advantage.

So much of the information within this report relies on the state of preservation in the landscape, a preservation which clearly remains under threat. The most sobering aspect of the work in 2024 was the continued and increasing presence of higher levels of oxygen in the deeply buried deposits, a worrying trend which has now continued its upward trajectory for three years. The once deeply buried Roman and Iron Age deposits within the bog are now only a few centimetres from the modern ground surface. The Magna project continues to shine a spotlight on the challenges we face in preserving and understanding our archaeological legacy in Britain and the results of 2024 will provide vital evidence to support the future management plans for this site. None of this would have been possible without the generous support of the National Lottery Heritage Fund, The Vindolanda Trust, and the hard work of hundreds of volunteers and dedicated specialists.

15. LIST OF ABBREVIATIONS

Cal. = calibrated radiocarbon date (see Appendix 6 for further information).

Pers. comm. = personal communication.

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

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

Unident. = unidentified.

15.1 POTTERY TYPES

HS = Housesteads; Rushworth 2009

CB = Corbridge; Bishop and Dore 1988

Gillam followed by a number (e.g. Gillam 126) = Gillam 1968

Webster = Webster 1996

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RIB 3398. Tombstone for Mamma. Permalink: https://romaninscriptionsofbritain.org/inscriptions/3398

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APPENDIX 1: CONTEXTS

Context No.	Description and Interpretation	Provisional Period
1	Topsoil and turf overlying both excavation areas. Very frequent roots from grass and reeds throughout, with particularly dense reed clusters over the top of the *vallum*. Generally loose and moist, but noticeably wet in the *vallum* and also generally darker. Same as M23-001.	Post Medieval
2	Cut of an E-W ditch that starts just to the east of the SE corner of the milecastle and runs broadly parallel with Hadrian's Wall. Extends beyond the LOE to the east. Stepped on the north edge with a steep southern side. Lower half of the cut terminates at the west end but upper step on the north edge continues on under the milecastle. There's an associated second terminus M24-33 and post hole M24-38 cut into the step immediately north of the terminus which continues west under the milecastle as well. Same as M23-101.	Pre-Hadrianic
3	Upper fill of ditch M24-2. Includes part of later cobbled surface M24-4 which has slumped down the south side of the ditch as well as overlying the fill. Continues east beyond the LOE and cut by a modern field drain. Also overlies the fill of post hole M24-38 and ditch terminus M24-33. Diffuse boundary between cobbles M24-4 and this fill where they run over the ditch. Same as M23-102.	Pre-Hadrianic
4	Loosely cobbled area to the south of milecastle 46. Butts up against the east edge of road M24-5 but is distinguished by less tightly packed cobbling. Cut by two modern field drains. Partially slumped into ditch M24-2, probably laid after the ditch was infilled. Defined on south edge by a band of sandy clay, M24-6. Most likely a waiting area/yard space for traffic crossing the wall through the milecastle. Cut by pits M24-9 and M24-17 near the SE corner of the milecastle. Overlies curvilinear ditch M24-26. Primarily excavated in 2023. Same as M23-059.	Late 2nd Century
5	Tightly packed cobbled road leading from the south gate of milecastle 46 towards the *vallum* and Magna fort. Abutted on east side by several cobbled surfaces, paths and roads: M24-4, M24-15, M24-37. Cut by a modern field drain and extends beyond the western LOE. Overlies large earlier pit M24-56 and western end of curvilinear ditch M24-26. Abutted by packed stone rubble infill of ditch M24-43 which may be part of the network of roads running east from this road between Hadrian's Wall and the *vallum*. First excavated in 2023. Same as M23-054.	Hadrianic
6	Band of light sandy clay running E-W between cobbled area M24-4 and path M24-15. Likely redeposited natural that built up over time as there's no charcoal, finds or other occupational material within the fill. Generally shallow and overlies the natural clay in most places. Overlies linear stone feature M24-19 at its north edge. No evidence for a cut suggesting this is the fill of a feature. Same as M23-105.	4th Century
7	Shallow sub-oval pit cut through a short N-S cobbled path M24-16. Single fill of pale orangey-brown sandy clay, similar to the material used as a bedding for the cobbled path. The pit has very steep to vertical sides and a roughly flat base and doesn't cut into the natural clay. No clear use or purpose for the pit and is likely a large pothole that has formed in the cobbled path over time, through use.	3rd Century

Context No.	Description and Interpretation	Provisional Period
8	Single fill of a shallow pit cut through cobbled path M24-16. Light orangey brown sandy clay, similar to the bedding material the cobbled path is set into. No finds or charcoal throughout the fill, and unclear use of the pit. Likely to be a pothole that has formed in the surface of the path over time and use, rather than a deliberate pit. Contained a slump of surrounding cobbles on the west edge of the pit.	3rd Century
9	Cut for a large sub-oval pit close to the southeast corner of the milecastle. Cut through the natural and likely predates the construction of the milecastle. Still Roman in date and may relate to pre-Hadrianic activity in the area such as marching camps or the construction of the wall. Likely to have stayed open once excavated and allowed the lower fill to build up over time before intentional backfilling. Cut on the western edge by pit M24-17.	Pre-Hadrianic
10	Primary fill of a large sub-oval pit M24-9 close to the southeast corner of the milecastle. Very dark soft fill. Likely the result of deposition as the pit was left open, then filled with water, and repeated until the pit was backfilled. Flecks of charcoal throughout, getting more frequent in the lower part of the fill.	Pre-Hadrianic
11	Cut for a steep sided ditch running N-S at the east edge of the trench. Base at the southern end is in the shape of a small 'ankle breaker'. Contains stone drain M24-22 in the central part of the ditch but this doesn't extend all the way along it. Silting deposit M24-60 on the western edge of the ditch suggests it was left open for some time before being backfilled. Runs between two earlier ditches, M24-26/13 to the north and M24-43 to the south, but doesn't intercut either of them. Seems contemporary to cobbled surface M24-30. Purpose unclear.	Late 2nd Century
12	Fill of a ditch on the eastern edge of the trench. Dark, soft fill with occasional cobbles in the upper part of the fill. Overlies and in places surrounds the capping stones of drain M24-22, where these have been lost it overlies the sides of the drain. Charcoal flecks throughout, becoming more frequent and larger lower down in the fill. Possibly cut by gully M24-36 on its eastern edge.	3rd Century
13	Cut for a large linear ditch, same as M24-26, which forms the north side of an Iron Age sub-rectangular enclosure. Shallow ditch with gradually sloping N side and much steeper S side with a small mound in the base at the south edge. M24-26 has a stone-faced structure on the southern side, probably part of a small rampart, fence line or hedgerow that further defined the enclosure boundary. M24-13 likely had a similar structure on its southern edge which was removed/damaged in later periods. Likely backfilled during the early Roman period to allow for use of the land by the Roman army.	Prehistoric
14	Upper fill of a large sub-linear ditch (east end of M24-26). Densely packed with large stone rubble across the surface of the fill. This secondary fill is not recorded elsewhere in the ditch and seems to further backfill the line of the ditch before the laying of cobbled surface M24-4 with the larger stone rubble deposited to consolidate the backfill. This may be because the ditch is less abraded at the east end and so needed further backfilling.	Hadrianic

Context No.	Description and Interpretation	Provisional Period
15	Linear area of cobbles running E-W across the whole excavation area and continuing below eastern trench edge. Runs between ditches M24-11 and M24-13 at east end, not overlying their fills. Abuts the east edge of road M24-5 and may have been a path leading away from the main road into the extramural area south of the milecastle. No evidence of structures or related activity within this area. Overlies the upper fill of ditch M24-45 at the western end and may in part have been laid to consolidate the ground surface over the infilled ditch. In roughly the centre of the trench it is abutted by path M24-16 on its south edge.	Late 2nd Century
16	Short section of N-S running cobbles in the centre of excavation area. Cut by pit or pothole M24-7 on NE edge. Abuts cobbled path M24-15 to the north and large cobbled area M24-37 to the south. May form part of a network of paths covering the southern extramural area but no clear evidence of associated buildings or activity in this area.	Hadrianic
17	Cut for a large sub-circular pit just outside of southeastern corner of milecastle which cuts the western edge of pit M24-9. Fill M24-20 suggests that the pit was left open for a while before being intentionally backfilled. Cut through the natural and likely predates the construction of the milecastle. Still Roman in date and may relate to pre-Hadrianic activity in the area such as marching camps or the construction of the wall.	Pre-Hadrianic
18	Primary fill of a large sub-oval pit M24-17 close to the southeast corner of the milecastle. Very dark soft fill. Likely the result of deposition as the pit was left open, then filled with water, and repeated until the pit was backfilled. Large sherds of an incomplete *amphora* laid just on top of this fill. Flecks of charcoal throughout, getting more frequent in the lower part of the fill.	Pre-Hadrianic
19	E-W aligned stone feature running along the south edge of ditch M24-26. Two parallel rows of stones with deliberate faces set into redeposited natural. Only one course of stone is present, unclear if there was ever more than one. Does not survive along the whole length of the area, in some places only inner/lower row of stones survives. Stone lines sit over the lower parts of the cut, with a higher area of natural between them (W shaped cut). May have formed part of a small rampart, fence line or hedge line further defining the enclosure ditch.	Prehistoric
20	Secondary fill of pit M24-17 which cuts pit M24-9. Both pits sit at the southeast corner of the milecastle. Likely deliberately backfilled as evidenced by the frequent angular cobbles within this fill. Fill was largely covered by cobbling, most likely part of cobbled surface M24-4 or to consolidate the backfill. Possibly backfilled ahead of the construction of the milecastle and its surrounding infrastructure.	Hadrianic
21	Secondary fill of pit M24-9. Similar composition to M24-20. Probably result of deliberate backfilling as evidenced by the frequent cobbles throughout. Fill was largely covered by cobbling, most likely part of cobbled surface M24-4 or to consolidate the backfill. Possibly backfilled ahead of the construction of the milecastle and its surrounding infrastructure.	Hadrianic

Context No.	Description and Interpretation	Provisional Period
22	Short section of stone box drain running NNW-SSE within ditch M24-11. Sides made from 1-2 courses of large roughly dressed stone blocks with large flagstones laid across the top as capping stones. Drain structure was disturbed at the N end with the capstones slumping into the fill of the drain and ditch. No evidence of the drain extending to the northern or southern termini of the ditch, but it may have been removed here in antiquity. Filled by very black waterlogged primary fill (M24-35) with a secondary fill (M24-12) around and immediately below the capstones. Unclear what this was draining water from or to as there are no associated structures.	Late 2nd Century
23	Primary fill of ditch M24-2, only present in deepest part of the ditch cut below the step in the northern side. This is most likely the initial silting up of the base of the ditch while it was open, suggesting it wasn't being cleaned out once dug, which was then buried by the deliberate backfilling of the feature. Contains frequent charcoal flecks and occasional larger stone cobbles in the base.	Pre-Hadrianic
24	Cut for a small posthole to the east of ditch M24-11. Cut through the fill of a small gully/possible beam slot M24-36 and associated with posthole M24-28 immediately to the west. These features together may represent the remains of a small timber building although the full extent of this was not visible in the trench. Very shallow so has likely been abraded over time.	4th Century
25	Fill of a small posthole to the east of ditch M24-11. Partial ring of packing stones defines the edge of the posthole with distinct charcoal rich fill within them. Shallow fill overall so is probably abraded. Associated with posthole M24-28 immediately to the west and possible beam slot M24-36.	4th Century
26	Cut for a shallow curvilinear enclosure ditch running through the site dating to the Iron Age. Primarily on an E-W alignment but turns to the south near the western LOE. North edge of the ditch is much shallower and less consistent than the south edge, may be abraded or deliberately reduced during the Roman period. Filled by M24-27 and M24-19, this is possibly the remains of a small bank or hedgerow further defining the enclosed space. The base has a raised mound in it underlying M24-19 on the southern side. Truncated by ditch M24-45, pit M24-56 and a modern land drain at the western end. Same as M24-13.	Prehistoric
27	Secondary fill of ditch M24-26, and the same as fill M24-31. Overlies the primary fill M24-19 and primarily fills the northern side of the ditch. Intentional backfilling of an Iron Age enclosure ditch likely during the early Roman period and possibly related to temporary marching camps or construction camps being erected in the area by the Roman army. Underlies a later Roman cobbled yard M24-4 and road M24-5. Cut by drainage gully M24-45 and early Roman pit M24-56 at the western side of the trench.	Pre-Hadrianic
28	Post hole immediately east of stone structure M24-22, and close to posthole M24-24. Sub circular and relatively shallow but has 4 packing stones surrounding the edge of the cut. Cut through the fill of a small E-W gully M24-36. This gully and two postholes may represent part of a small structure but no further evidence of this was found in the trench.	4th Century

Context No.	Description and Interpretation	Provisional Period
29	Fill of a small posthole immediately east of drain M24-22. Contains several packing stones around the edge of the posthole, some of which are displaced. Dark fill which is very similar to the fill of the underlying gully M24-36, mainly distinguished by the presence of the packing stones. No finds or clear signs of a decayed post.	4th Century
30	Small patch of cobbles set in white clay, directly adjacent and contemporary to ditch 11. Clear firm cobbled surface directly atop natural with topsoil above. No evidence of other usage/refuse but size could indicate a larger surface being present originally and later removed. Doesn't directly link to M24-37 so unclear if they are contemporary.	Late 2nd Century
31	Secondary fill of ditch M24-13, and the same as fill M24-27. Intentional backfilling of an Iron Age enclosure ditch likely during the early Roman period and possibly related to temporary marching camps or construction camps being erected in the area by the Roman army. Underlies further backfill material M24-14 at this eastern end of the ditch. Contained a number of large cobbles representing the tumbled/displaced remains of M24-19.	Pre-Hadrianic
32	Fill of a shallow E-W gully to the east of ditch M24-11. Cut by two postholes which may be contemporary with the gully, and similar to the fill of posthole M24-28. Contains occasional flecks or charcoal and is most likely formed through the backfilling of the gully after it was no longer in use. Also similar to M24-12 but contains less charcoal.	4th Century
33	Likely eastern terminus of a ditch which pre-dates the milecastle and continues west under the milecastle walls. Probably contemporary with ditch [2] but exact relationship is unclear, sit immediately north of the lower terminus of M24-2 and is cut into the step on the north edge of this ditch. Pit/posthole M24-38 is cut into the terminus of the ditch. Was later cobbled over and buried under the wall of the milecastle during the Hadrianic period. No evidence of this feature was seen during the 2023 excavations.	Pre-Hadrianic
34	Fill of the terminus of ditch M24-33 which continues underneath the milecastle and is possibly contemporary with ditch [2]. Cut by posthole/pit M24-38 at eastern end of the terminus and underlies secondary fill of M24-2. Fill seems similar to the primary fill of ditch [2] and the fill of M24-38.	Pre-Hadrianic
35	Very dark organic rich deposit acting as the primary fill of stone box drain M24-22 within ditch M24-11. Not present in the southern end of the ditch beyond the stone drain. Runs up to the north terminus of the ditch where the stone drain has been disturbed/removed suggesting it once ran all the way to the north end of the ditch. Most likely formed during the use of the drain suggesting it was not cleaned out or maintained after its initial construction. Still very wet upon excavation which will have aided the preservation of organic material and means this probably formed while the drain was still channelling water.	3rd Century
36	Cut for a shallow E-W linear in the eastern trench extension. Cuts through the upper fill of M24-11 towards its western end. Only has one fill and cut by two small postholes (M24-24 at east end, M24-28 at west end). Turns at right angles to head north beyond M24-24 but this is mostly under the LOE. May be a short beam slot related to a timber building in this area.	4th Century

Context No.	Description and Interpretation	Provisional Period
37	Spread of well formed and tightly packed cobbles in the southern part of the trench. Borders large stone rubble ditch infill running along the south trench edge but no evidence it overlies this feature. Some areas of disturbance/ potholes in the southern edge of the cobbling and cut by the modern land drain. Similar to M24-30 but no definite relationship can be seen between the two. Overlies the upper fill of large pit M24-91 in the SE corner of the trench. Joins onto the east edge of road M24-5 at its western end, is likely a branch leading off the Military Way towards the milecastle.	Late 2nd Century
38	Post hole cut into the terminus of ditch [33]. No evidence of packing stones within the cut. Original purpose is unclear but is likely to be contemporary with the ditch terminus and backfilled at the same time. No equivalent posthole in the lower terminus of ditch M24-2.	Pre-Hadrianic
39	Fill of posthole [38] cut into the west end of terminus M24-33. Same fill as (34) which suggests that the ditch terminus and posthole were backfilled simultaneously. Likely an intentional backfill before the final backfilling of ditch M24-2 which this is cut into the north side of. Very badly corroded iron object that may have been part of a helmet found within fill. Probably backfilled as the area was levelled for the construction of the milecastle.	Pre-Hadrianic
40	Cut for a very shallow small gully running N-S to the east of ditch M24-11. Break of slope is very gradual at the top and the feature is difficult to see in plan post-excavation. Continues beyond the limit of excavation to the south but terminates at the north end. May be related to small gully M24-36 to the north but overall purpose is unclear due to the shallow depth and not excavating the effulgence length.	3rd Century
41	Fill of a shallow gully running N-S immediately to the east of ditch M24-11. Similar to M24-12 in appearance with frequent charcoal inclusions throughout. Very shallow deposit overall with diffuse edges in plan pre-excavation. May be associated with small gully M24-36 immediately to the north. No finds.	3rd Century
42	Topsoil underneath the turf in the *vallum* trench. Frequent cobbles and stones throughout and lots of roots from overlying grass and reeds. Functionally the same as M24-1. Overlies all archaeological deposits.	Post Medieval
43	Cut for a shallow E-W running ditch at the southern edge of the trench. North side is formed by kerbstones which may be associated with cobbles M24-37 immediately to the north of this ditch. South edge is more gently sloped and has no kerbing along the upper edge. Ditch extends beyond the LOE to both the east and west and intersects with road M24-5 to the west. The relationship between these is unclear but there is no sign of the cobbling from the road extending over the upper fill of the ditch.	Pre-Hadrianic
44	Upper fill of shallow ditch M24-43, overlies two abutting lower fills (M24-54, M24-55). Primarily composed of large stone rubble in a silty clay soil. This rubble is densely packed into the fill, particularly at the surface suggesting it was intentional backfilling and may have been a consolidation deposit to create a solid surface over the ditch. Occasional finds of Roman pottery from this deposit. This deposit is not overlain by the cobbles of road M24-5.	Hadrianic

Context No.	Description and Interpretation	Provisional Period
45	E-W running ditch immediately south of ditch M24-26. Eastern end of the ditch is very shallow, narrow and only has the lower fill M24-51 present; cuts into the south edge of ditch M24-13. At the west end the ditch is deeper, wider and has two fills; cuts the east edge of ditch M24-26 and terminates in the centre of this ditch. The terminus is truncated by a modern land drain so it profile couldn't be recorded. Likely intended as a drainage channel leading downslope to the west from areas of occupation or activity to the east however these were not found during the excavation.	Pre-Hadrianic
46	Upper fill of ditch M24-45, only present in the deeper western half of the ditch. Similar to the lower fill but contains more cobbles and is probably the intentional backfilling of the ditch once it is no longer needed. Underlies later cobbled path M24-15 which may in part have been laid to help consolidate the upper fills of the ditch as the use of the space changed.	Late 2nd Century
47	Cut for a stone lined well surrounded by cobble stones. Cut into the geological clay with the lining stones placed immediately against the walls of the cut. Stone lining was not dismantled so full profile of the cut was not seen. Sits at the junction of the Military Way with the road linking the milecastle and fort.	Late 2nd Century
48	Uppermost fill of well M24-52. Similar to the surrounding subsoil and is the final infilling of the well to level off with the surrounding ground surface. Likely to have happened soon after the deposition of M24-49 to complete the closing of the well.	4th Century
49	Third fill of well M24-52, overlying the waterlogged organic layer M24-50. This fill is wet but not fully waterlogged and has no preservation of organic material. The higher volume of stone within this context suggests it is a deliberate infilling of the well once it is no longer in use.	4th Century
50	Waterlogged secondary fill of well M24-52. Lots of organic inclusions preserved in this layer but no organic artefacts. Likely represents the first fill formed after the well fell out of use and was no longer being cleared of material that gathered inside it.	4th Century
51	Lower fill of ditch M24-45, present along its full length and only fill in the eastern half of the ditch. Similar to the upper fill but doesn't contain the same cobble inclusions throughout. Formed over time through the gradual silting up of the base of the drainage channel suggesting it was not maintained for a long period of time after its construction.	Late 2nd Century
52	Stone lining for a Roman well south of milecastle 46, at the junction of roads M24-5 and M24-89. Made of roughly dressed oblong stone blocks. Regular coursing for the full depth of the well, some sandstones soft and eroded. Inside surfaces of the well haven't been dressed to form a curve.	Late 2nd Century
53	Primary fill in the base of well M24-52. Somewhat waterlogged with minimal organic material recovered (wood found in soil sample bucket). Similar to surrounding clay so most likely caused by siltation while the well was in use, with material from the surrounding area being washed into the well.	3rd Century

Context No.	Description and Interpretation	Provisional Period
54	Lower fill on the northern edge of ditch M24-43. Consisted of soft very dark soil with very frequent charcoal inclusions, surrounding a large amount of stone rubble. This rubble is very similar to that in upper fill M24-44 however the soil is much darker with a higher frequency of charcoal. Does not extend the full width of the ditch, abuts M24-55 to the south, but seems consistent for the full length of the ditch. May represent material being washed in from upslope or being dumped into the ditch from road M24-37 and building up along the northern side.	Pre-Hadrianic
55	Defined band of densely packed cobbles in the base of ditch M24-43 towards the south edge. Abuts M24-54 to the north and underlies rubble fill M24-44. Overall purpose of this cobbling is unclear as its location in the base of a ditch makes it unlikely to be a path. Also unlikely to be caused by cobbles rolling into the ditch or being discarded there as they have a consistent and deliberate form along the length of the ditch. May have been laid to assist drainage or consolidate the base of the ditch.	Pre-Hadrianic
56	Cut for a large sub-oval pit underlying road M24-5. Extends under the west LOE and is cut on the east edge by a modern field drain. Cut through the western edge of ditch M24-26. North edge is steeper than the south and has been eroded in antiquity by water running into the pit along this side, base is also uneven, likely for the same reason. Purpose is unclear but may be associated with two intercutting pits at the SE corner of the milecastle.	Pre-Hadrianic
57	Fill of a large pit cut through the edge of ditch M24-26. Capped directly by cobbled road M24-5 heading south from the milecastle, some cobbles intermingled with the upper part of the fill. Large whinstone boulder in the base of the pit on the north edge. Cut by a modern field drain on the east side. No clear indication of the use/purpose of the pit, fill formed through silting up of he pit over time.	Pre-Hadrianic
58	Cut for a curvilinear ditch running E-W across the trench and curving slightly to the south at both ends. There is evidence that it was left open as it has a primary layer of silt in the base (M24-72). It has been truncated by a modern field drain and filled with two fills, the primary fill M24-72 being gradual silting over time and the secondary fill M24-59 being a later backfill. Runs between two sections of the Military Way, M24-89, and may have been used a roadside drainage ditch for this road.	Late 2nd Century
59	This is the secondary fill of ditch M24-58 and is evidence of deliberate backfilling. It has been truncated by a more modern field drain. There was Roman pottery throughout the fill suggesting that the ditch was used for rubbish disposal during its backfilling. Overlies primary fill M24-72. Contains moderately frequent cobbles and rubble, likely from the adjacent road surface and possibly included to consolidate the infilled material. At the west end it is overlaid by a cobbled road running N-S, probably the road running from the milecastle to the fort.	4th Century
60	Sandy clay lower fill of ditch M24-11. Underlies M24-12, M24-35 and occasional capstones related to drain M24-22. Overlies M24-61 at the southern end of the ditch. Only present along the western edge of the ditch for much of its length, infilling the space between the side of the ditch and stone drain M24-22. Broadly similar to the natural and is most likely the initial silting up of the ditch while it was open/in use. Occasional finds probably washed in during this silting process.	Late 2nd Century

Context No.	Description and Interpretation	Provisional Period
61	Primary fill of ditch M24-11. Only present in a potential 'ankle breaker', a small steep sided slot in the base of the ditch. Very heavy clay devoid of finds or inclusions. Still wet during excavation suggesting this area may have contained standing water during the formation of this deposit. Continues to the north under the west side of stone drain M24-22.	Late 2nd Century
62	Cut for a small pit east of well M24-47, one of a pair with M24-64. Moderately steep sides and rounded base with a single fill, no evidence of packing stones or other features of a posthole. Underlies abraded cobbled surface M24-89. Purpose of pits is unclear as no associated structures but may be related to cremations further south.	Pre-Hadrianic
63	Fill for a small pit east of well M24-47, one of a pair with M24-64. Fill of both pits is broadly the same, dark with frequent charcoal inclusions throughout. Underlies abraded cobbled surface M24-89. Purpose of pits is unclear as no associated structures and do not seem to be postholes but may be related to cremations further south.	Pre-Hadrianic
64	Cut for a pit east of well M24-47, one of a pair with pit M24-62. This is the larger of the two and is south of M24-62, both overlaid by abraded cobbled surface M24-89. Steep sides and a rounded base but no packing stones or other evidence of having been used as a posthole. The purpose of the pits is unclear as there is no associated structures or features but may possibly be related to the cremations further south.	Pre-Hadrianic
65	Fill of pit M24-64, one of a pair with M24-62. Broadly similar to M24-63, dark silty clay with frequent charcoal inclusions throughout. Directly underlies abraded cobbled surface M24-89. Fill spreads a short distance north towards pit M24-62 but no clear cut fro this material so likely to be spreading or dragging of the material at a later date. No evidence for the pit having been a posthole and purpose is unclear, but may be related to cremations further south.	Pre-Hadrianic
66	Cut for an irregular sub-oval pit between ditches M24-43 and M24-11. Sides and base of this pit are very uneven and there is no direct relationship with either of the ditches. Main fill was very similar to the natural and it is likely this a geological feature rather than archaeological, possibly formed by glacial activity.	Unknown
67	Small lens of dark waterlogged soil in roughly the centre of the fill of pit m24-66. This may represent the insertion of a small cut feature like a posthole into this feature however no clear sides of the feature were visible during excavation. This could also be overspill of waterlogged material from drain M24-22 immediately to the north filling a stone hole or cavity within the fill of pit M24-66.	Unknown
68	Main fill of pit M24-66. Generally similar to the surrounding natural but looser in compaction suggesting it has been redeposited. M24-67 is contained within this fill, in a small cavity in the centre of the fill with more frequent rocks. Overall shape and fill of this feature means it is more likely to be geological in origin, possibly worn out by glacial activity and then filled by redeposited clay.	Unknown
69	Small N-S ditch cut through the north and south sides of the *vallum* at the east section of the trench. Not fully excavated due to section collapse making the area unsafe.	3rd Century

Context No.	Description and Interpretation	Provisional Period
70	Fill of ditch cut N-S across the *vallum* at the east section of the trench. No sign of intentional backfilling, fill formed due to the silting up of the ditch over time after it fell out of use. Not fully excavated due to section collapse making area unsafe.	4th Century
71	Uppermost fill of the *vallum* ditch. Overlies all three modern drains cut into the *vallum* (two ceramic pipes and M24-87) so relatively modern. very homogenous across full width of the *vallum*, grey silty clay that has built up in the natural hollow formed by the infilled ditch over time. Some sherds of Roman pottery from within this material, likely disturbed from their original context during backfilling or digging the drains. Similar to overlying topsoil.	Post Medieval
72	This is the primary fill of ditch M24-58. This most likely formed while the ditch was open through gradual silting up of the base. Occasional sherds of pottery found within this deposit. It has been truncated by a more modern field drain and covered by a secondary fill M24-59. Flecks of charcoal and occasional cobbles throughout, the latter most likely from the adjacent road surfaces.	3rd Century
73	Clay foundation for the northern defensive mound of *vallum*. Formed of compacted blocks of clay, visible in section as different coloured lozenges. Cut by later ditch M24-85 towards west side of trench and an animal burrow at the east side. Cluster of cremations were buried in close association with the south side of the mound, some within ditch M24-85. Occasional large stone rubble blocks within the mound, particularly on the north edge and west trench edge, they may be remnants of kerbing along the edge of the mound.	Hadrianic
74	Shallow gully running SW-NE immediately north of ditch M24-101. Cut by M24-153 at its western terminus and continues beyond the excavation to the east. The purpose of the gully is unclear but may be associated with the nearby cremations or drainage gullies. Given the right angle formed by its intersection with M24-153 it may be a beam slot for a small timber building as both gullies are a similar size and shape.	3rd Century
75	Fill of small gully M24-74 to the north of ditch M24-101. Charred piece of wood was discovered in the base of the gully but otherwise little signs of intentional backfilling. The fill likely formed as the gully silted up over time after falling out of use. Very similar to the fill M24-154 of intercutting gully at the west terminus of this gully.	3rd Century
76	Same as M24-153.	3rd Century
77	Same as M24-154.	3rd Century
78	Irregular gully cut into the north side of the *vallum*, immediately west of M24-80. Terminates at its northern end, but overall purpose is unclear as it does not intercut with drainage gully M24-80 or extend further north upslope towards the areas of activity and cremation burials. Cut by a modern field drain so full profile and relationship with neighbouring features is unclear.	3rd Century
79	Fill of gully cut into the north bank of the *vallum*, immediately west of M24-80. Cut by a modern field drain so much of the original fill has been disturbed. No signs of deliberate backfilling so most likely formed over time as the gully silted up after it had fallen out of use.	3rd Century

Context No.	Description and Interpretation	Provisional Period
80	Small gully running NW-SE across the north berm of the *vallum*. North terminus is immediately south of the north mound of the *vallum* and the gully follows a curvilinear path south to the *vallum* where it is cut into the north side. Doesn't intercut any of the other features on the north berm so is likely contemporary with them and associated with later Roman activity in this area after the initial construction of the *vallum*. Most likely was dug as drainage to channel water into the *vallum* however what it was draining away from is unclear. Cut by a modern field drain at the southern end.	3rd Century
81	Primary fill of drainage gully M24-80. Likely caused by wind or rain depositing material in the gully while it was open over an extended period of time. Suggests the gully was not maintained or cleaned out after its initial construction. Present along the full length of the gully.	3rd Century
82	Dark charcoal dense fill only at the southern end of the ditch before it drops into the cut of the *vallum*. May be a cremation deposit related to those to the north, but this is a larger burnt deposit with lower volume of bone for the size of deposit. Forms a discrete oval of material overlying the other fills of the gully, so has not been washed down the gully but was intentionally deposited here.	3rd Century
83	Large pit to the east of the cremation cluster on the north berm of the *vallum*. Sub circular with the west side extending out in an upwards slope, may be erosion/truncation from the neighbouring cremation burials but may have been constructed like this to aid in depositing cremation 'waste' in the pit. Filled by stratified cremation waste M24-84 and was likely the 'waste' pit where excess ash from a cremation was buried, thus the large size.	3rd Century
84	Primary fill of pit M24-83. Formed by the repeated deposition of cremated material in the pit to bury the remaining pyre material and bone after a cremation ceremony. Formed a mound above the surrounding ground level which likely explains the formation of spread M24-96 as the pit was overfilled. Some stratification visible within the deposit to indicate the reuse of the feature, with some layers containing more bone or charcoal or carbonised wood than others. Unclear exactly how many individuals/cremations are represented within this fill. Significant amount of burnt rosewood throughout which was commonly used in the pyres, this has been sampled. 100% sampled for collection of burnt bone.	3rd Century
85	Short N-S section of shallow ditch cut into the foundation of the *vallum's* north mound, adjacent to stone rubble M24-113. Full extent of this feature is unclear due to other intercutting features but does not extend the full width of the north mound. Two cremation burial (M24-104, M24-107) and ash deposit M24-106 were buried along the east edge of this ditch with the rest of the cremation cluster to the south. Purpose of this ditch is unclear but it was possibly an enclosure ditch used to signify the boundaries of the cremation cemetery, associated with M24-101 to the south.	3rd Century
86	Fill of short ditch section M24-85. No clear signs of intentional backfilling, frequent charcoal through the fill and concentrations of burnt bone at the south end but these are both likely from commingling of the fill with the surrounding cremations. Ash deposits M24-104, M24-106 and M24-107 were buried into the upper part of this fill.	3rd Century

Context No.	Description and Interpretation	Provisional Period
87	Modern stone box drain within upper fills of the *vallum*. Flows west downslope. Drystone construction of roughly sorted limestone, with irregular cobbles used to infill the gaps. No stone base to the drain, cut into M24-88 and covered by M24-71. Likely built during Clayton's ownership as an attempt to improve the land for farming, channeling water from the wettest low point of the field.	Post Medieval
88	Second uppermost fill of the *vallum*, underlying M24-71 and cut by M24-87 and the other 19th century field drains. High concentrations of iron ore within the soil creating the yellow/orange staining of the soil, suggests this fill was very wet during its formation. Likely dates to the later periods, medieval or post-medieval, and formed by silting up of the low lying area of the field. May include material washing in from the remains of the north and south mounds.	Post Medieval
89	Broad area of loose cobbles and silty clay to the north of the north mound. Runs broadly parallel with the north mound and *vallum* (NE-SW) across the full width of the trench . Does not abut the north edge of the mound, stops a short distance to the north. Cut by/present on both sides of ditch M24-58 and cut by a modern field drain. Most likely represents the damaged remains of the Military Way running between the *vallum* and Hadrian's wall and joins onto the east edge of the road heading south from the milecastle. May have also been used as a working platform in the later Roman periods associated with activity on the north berm.	Late 2nd Century
90	Semi anaerobic fill of *vallum*, formed of degraded turves from the north and south mound. Only present as a consistent spread in the northeast quadrant of the trench rather than across the full width of the excavated *vallum*. While the turf sods are likely Roman and originally formed part of the north and south mounds, their deposition in the *vallum* to form this deposit likely dates to the medieval or post-medieval periods and efforts to improve the land for agriculture. Not fully excavated due to section collapses making the area unsafe.	Medieval
91	Large pit in the SE corner of the trench south of the milecastle. No clear purpose for this pit but it is broadly similar to other large pits in this area. Underlies cobbled road surface M24-37 and is adjacent to the south end of drain M24-22. Likely Roman in date and related to pre-Hadrianic activity in the area which was then buried during the construction of the milecastle and Wall. Single piece of Roman CBM found in the fills.	Pre-Hadrianic
92	Shallow deposit in the base of pit M24-91. Likely formed by material washing into the pit before it was infilled suggesting it was not being maintained/kept in use after its initial construction. May well have formed in standing water in the base of the pit. No clear purpose or definite date for the pit.	Pre-Hadrianic
93	Upper fill of pit M24-91 south of the milecastle. Broadly similar to M24-92 with limited evidence for the use or date of the pit. Lack of artefacts within this deposit suggest it was not used as a midden but this was likely intentional backfill of the pit, possibly during the Hadrianic period's extensive remodelling of the landscape for the construction of milecastle 46 and Hadrian's Wall, to allow the creation of cobbled road M24-37.	Hadrianic

Context No.	Description and Interpretation	Provisional Period
94	Possible pit on south edge of ditch M24-101 and in close proximity to gully M24-80. Sides of the pit have been heavily truncated by these linear features so full shape of this feature was unclear, initially seen only by the differences in the fill. Relationship between this pit and ditch M24-101 is unclear, the pit occupies a raised platform in the south edge of the ditch. No obvious purpose for this pit.	3rd Century
95	Fill of small pit M24-94 in the south edge of ditch M24-101. Relationship between these two features is unclear but the two fills are distinct from one another. Also partially cut by gully M24-80 running immediately to the west of these features. No clear evidence for the purpose or date of this feature.	3rd Century
96	Diffuse spread of silt and cremated material (bone and charcoal) to the south and west of pit M24-83. Most likely the same as M24-84 and represents the final deposition of this material that has then been washed/blown over the surrounding area. Was overlying cremations M24-99, M24-103, M24-105 and M24-117. May be slightly mixed with the uppermost fill of ditch M24-85.	3rd Century
97	Upper fill of gully M24-97, overlying silting M24-81. Present along the full length of the feature, and may be an intentional backfilling as implied by the presence of river cobbles throughout the fill. Very little finds but there is limited evidence for long term occupation in this area.	3rd Century
98	Cut for a cremation pit. Initially thought to be the cut for cremation deposit M24-99 but after excavation does not relate exclusively to this burial. This cut was likely an extension of the main cut for ditch M24-85 OR part of a larger cut to contain all three cremations in this cluster (M24-99, M24-103, M24-105). Relationships between the intercutting cremation pits and ditch was not clear due to overlying spreads.	3rd Century
99	Cremation burial on the west edge of larger pit of burnt remains M24-83. Closely associated with cremations M24-103 and M24-105. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. Placed in cut M24-98 but this is not the only deposit it contains. No evidence survived of any above ground marker for the burial. Confirmed bone and ash.	3rd Century
100	Small lens of potentially degraded turf material underlying clay foundation for northern *vallum* mound. Excavated at the eastern edge of the trench but probably extends across the full width of the trench, though preservation may vary. This is the remains of the historic ground surface in the Roman period as opposed to turf used in the construction of the *vallum* mound.	Pre-Hadrianic
101	Cut for a deep ditch crossing the north berm of the *vallum* and continuing east beyond the trench. Runs broadly parallel to the *vallum* and terminates roughly halfway across the trench. Associated with a series of small ditches and gullies on the north berm, some of which cut into the north side of the *vallum*, indicating later reuse of this space after the initial construction of the *vallum*. Purpose of the ditch is uncertain but it may be part of an enclosure, with the excavated terminus forming one side of an entrance. May be enclosing the space to the north where the northern group of cremation burials is located.	3rd Century

Context No.	Description and Interpretation	Provisional Period
102	Upper fill of ditch M24-101 on the north berm of the *vallum*. This deposit is similar to the surrounding subsoil and fills of the neighbouring gullies suggesting that this ditch also wasn't deliberately backfilled but instead left to fill in over time once the area was no longer in use. Square pit M24-109 was then cut into the upper layers of this deposit, which may be related to the nearby cremations. Cut by a modern field drain on south side.	3rd Century
103	Cremation burial containing burnt bone, charcoal and ash. Lies to the west of larger pit M24-83 and in between M24-99 and M24-105, forming a cluster. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial.	3rd Century
104	Discrete deposit of burnt material on the east edge of ditch M24-85. Central one of three such deposits along this edge. Immediately northwest of cremations M24-99, M24-103, M24-105 and larger cremation pit M24-84. Occasional fragments of bone within this deposit but not enough to indicate it was a cremation burial, the deposit is primarily ash and charcoal. Exact purpose of this is unclear but it may still be related to the cremations.	3rd Century
105	Cremation burial containing burnt bone, charcoal and ash. Lies to the west of larger pit M24-83 and to the south of M24-99 and M24-103, forming a cluster. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial.	3rd Century
106	Southern one of three such deposits along this edge. Immediately northwest of cremations M24-99, M24-103, M24-105 and larger cremation pit M24-84. No fragments of bone within this deposit, it is primarily ash and charcoal. Exact purpose of this is unclear but it may still be related to the cremations.	3rd Century
107	Discrete deposit of burnt material on the east edge of ditch M24-85. Northern one of three such deposits along this edge. Immediately northwest of cremations M24-99, M24-103, M24-105 and larger cremation pit M24-84. Occasional fragments of bone within this deposit but not enough to indicate it was a cremation burial, the deposit is primarily ash and charcoal. Exact purpose of this is unclear but it may still be related to the cremations.	3rd Century
108	Band of darker silt that built up against the northern face of the *vallum's* north mound. No evidence of this material filling a deliberately cut feature and so most likely is a natural silt build up after the construction of the mound. Occasional sherds of pottery show this formed during the Roman period, most likely by material getting washed downslope and gathering at the foot of the mound. Overlies historic ground surface M24-111.	3rd Century
109	Rough square cut for a deposit of burnt ash and charcoal, cut into the upper fill of ditch M24-101. Base of the cut is sloped and deepest on the northern side, making it unlikely this was dug to bury a box or other square container. Located to the southeast of cremations M24-99, M24-103, M24-105, but no bone was recovered indicating this is not a cremation itself. The shape of the cut is unusual but of unclear purpose.	3rd Century

Context No.	Description and Interpretation	Provisional Period
110	Fill of square pit M24-109, cut into the upper fill of ditch M24-101. Very high volume of charcoal in this fill, but origin is unclear. Located to the southeast of cremations M24-99, M24-103, M24-105, but no bone was recovered indicating this is not a cremation itself. Shape of the cut makes it unlikely this deposit was buried in a box or other container.	3rd Century
111	Degraded remains of the historic turf and topsoil. Excavated along the north edge of the *vallum's* north mound where it underlies a band of silt M24-108. Seen in section to continue under the clay foundation of the mound this is not construction turf, but was Roman ground surface the northern *vallum* mound was built on top of. Regular flecks of charcoal and dark patches of degraded turf within the lighter grey clay.	Pre-Hadrianic
112	Primary fill of ditch M24-101, formed through the gradual build-up of silt over time while the ditch was open. There is no evidence of the ditch being cleaned out or recut so likely wasn't intended for long term use. This deposit probably formed while the ditch had standing water in the base, allowing for the preservation of some organic material within this context.	3rd Century
113	Concentration of large, subangular cobbles and boulders at the west side of the trench, set into the clay foundation of the *vallum's* north mound. No evidence for an associated cut, the boulders are arranged in a linear E-W alignment and lie just west of ditch [85]. In close proximity to the cremations and so could be associated with this later reuse of the space, however the purpose is unclear.	4th Century
114	Irregular pit with large stones cut into the north side of the *vallum's* north mound. Cut was not visible in plan pre-excavation but several large boulders were visible that may have been packing stones in a posthole. No other pits found in association with this one so posthole is a less likely function, overall purpose of this pit is unclear. Associated with a series of other small features cut into the north mound indicating later reuse of this space including M24-85 and M24-113.	3rd Century
115	Fill of pit M24-114, primarily composed of several large limestone boulders that fill the cut. Stones may have been part of a kerb along the base of the mound but if so, then only handful now survive. Overall purpose of this pit is unclear as there were no other pits found in association with this to suggest it could have been a post built structure.	3rd Century
116	Small concentrated lens of charcoal immediately west of cremations M24-99, M24-103, M24-105, M24-117. May be similar to or part of the wider spread M24-96 that covers the cremations and contains wind blown/ washed material from the larger pit M24-83. Contained no bone and too small to be a cremation.	3rd Century
117	Cremation burial in cluster immediately west of larger cremation pit M24-83, containing burnt bone, charcoal and ash. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial.	3rd Century

Context No.	Description and Interpretation	Provisional Period
118	Greyish blue clay fill of the *vallum*, stratigraphically contemporary with M24-90, present across the majority of the excavated area. Overlies first major backfill M24-189 and may have also been intentional infilling for agricultural purposes, like M24-90. No turf remains present in this material however and may have also formed while there was standing water in the ditch, allowing the clay to settle and form.	Medieval
119	Subsoil just under turf between the *vallum's* south mound M24-142 and early Roman ditch M24-127. Lots of root and animal interference throughout and cut by drainage ditch M24-120. Contained some sherds of Roman pottery and only present between two major Roman landscape features suggesting it formed in the later Roman period, partially building up against the base of the *vallum's* south mound. Overlies part of an earlier prehistoric ditch M24-164.	4th Century
120	Northern ditch of a double ditch system at the south end of the trench. Visible pre-excavation as a shallow depression in the field, only became so in recent years due to the overlying bog drying out. Steep sided modern cut for a stone field drain, likely dates to the late 1800s and Clayton's ownership of Carvoran.	Post Medieval
121	Intentional backfill of ditch M24-120. Similar to M24-126 in composition, but not specifically capping drain M24-125, likely deposited in the same general backfilling of the ditch after the drain was constructed. Similar to the surrounding boulder clay the ditch is cut through.	Post Medieval
122	Uppermost fill of ditch M24-120, very similar to surrounding subsoil M24-119. Occasional patches of clay and limestone cobbles throughout this material, particularly at the eastern end of the trench. This may be the final intentional backfilling of the ditch to level the area with the surrounding field but probably formed through silt building up over time in any remaining hollow left after the backfilling of the ditch.	Post Medieval
123	Degraded turf deposit underneath southern *vallum* mound M24-142. Represents the remains of the original turf and topsoil which the *vallum* mound was built on top of. Recorded in both the east and west section of the trench but does not survive as a continuous layer beneath the clay foundation of the mound.	Pre-Hadrianic
124	Cobbled road surface running E-W built along the ridge between ditches M24-120 and M24-127. Southern edge of the surface extends across M24-128, the uppermost fill of the earlier Roman ditch. Also overlies N-S prehistoric ditch M24-136 and may be truncated by later drains on its north edge. Overall the cobbles are poorly sorted and not tightly packed, and the purpose of the path in unclear. Likely to be later Roman in date or possibly medieval.	4th Century
125	Likely late 19th century square drain laid into ditch M24-120. Two course height but capped with large, sub-angular boulders. Dating evidenced by relatively little siltation M24-131 within drain and similarity of construction to drains of this period observed at Vindolanda. Stone drain is oriented E-W and has a clay field drain draining into it from the northern side. Caped by dense layer of clay and rubble M24-126.	Post Medieval

Context No.	Description and Interpretation	Provisional Period
126	Clay and stone fill of ditch M24-120. Overlies and acts as an additional sealant for stone drain M24-125 in the base of the ditch. Intentional backfilling of the ditch after the drain was laid to reinstate the field. Clay is almost identical to the surrounding boulder clay natural, obscuring the edges of the ditch, likely the same material that was dug out to lay the drain.	Post Medieval
127	Southern counterpart of double ditch system on either side of E-W road M24-124. Most likely an early Roman military ditch for a fort or annexe relating to the timber building immediately to the south. There is a double 'ankle breaker' in the base running E-W. The sides are steep but there is evidence of collapsing which makes them look stepped. Cut by modern drains at the east edge of the trench.	Pre-Hadrianic
128	Uppermost fill of ditch M24-127. Dark colour is likely due to the reed beds present prior to deturfing and frequent waterlogging of the area. These reed beds also caused significant disturbance as did animal burrows. Likely intentional backfilling of the ditch during the Hadrianic period so as to allow a clear path to MC46, and because the ditch was no longer needed with the *vallum* in play.	Hadrianic
129	Probable treebole as evidenced by uneven base and irregular sides. Signs of bioturbation likely caused by tree roots extending out from main bole. Cut by the ditch for post-medieval drain M24-125 on its south side. Date is unclear but may date back to the Roman period.	Unknown
130	Natural siltation of the root bole after the tree rotted away or was removed from M24-129.no finds or indication of the date but may date back to the Roman period. Cut by construction of post-medieval drain M24-125.	Unknown
131	Natural silt and gravel buildup within drain M24-125. Siltation is relatively low, which indicates that the stone drain has not been running for several centuries and is post-medieval rather than Roman. This is also supported by the lack of finds. This deposit is still forming as the drain still functions and more gravel and silt will be deposited over time.	Post Medieval
132	Second uppermost fill of ditch M24-127, this layer is semi-anaerobic with some preservation of organic material. Lots of purposeful dumping of material in this fill, as well as M24-133 below, much of which seems related to timber buildings and occupation debris. Suggests that this is part of the intentional backfilling of this ditch when it was no longer needed and that any nearby timber buildings had also gone out of use at this time. Probably backfilled in the Hadrianic period to improve access to the milecastle.	Late 2nd Century
133	Anaerobic fill of ditch M24-127, underlying M24-132. Large amounts of preserved organic debris and matter throughout this fill. Frequent finds in this layer including leather shoes suggesting the dumping of rubbish into the ditch during the Roman period. Wooden planks and other pieces of timber buildings such as wattle fence sections were also found throughout this layer. The lower boundary of this fill is partially demarcated by hair moss growth. This material also fills a U-shaped recut of the ditch suggesting this was the start of the final infilling of the ditch as it fell out of use.	Pre-Hadrianic

Context No.	Description and Interpretation	Provisional Period
134	Shallow E-W running ditch underlying the southern edge of the *vallum's* south mound. Does not extend across the full width of the trench but continues west beyond the eacvaation. This is likely to date to be pre-Roman in date as it is cut into the natural clay and underlies the foundation of the *vallum* mound however it does not seem to intersect with other nearby prehistoric ditches. The purpose of this ditch is also unclear.	Prehistoric
135	Fill of ditch M24-134. This is likely the result of intentional backfilling during the Roman period as they remodelled the landscape for their needs. As the only fill it also suggests this ditch was in use and being regularly cleaned out of any silt build up until the arrival of the Romans.	Pre-Hadrianic
136	Short section of a N-S running prehistoric ditch. This ditch has been heavily truncated by later features including ditch M24-127 to the south and drainage ditch M24-120 to the north. A later treebole M24-138 also cuts through the east edge of the ditch. The original size and shape of this feature have therefore been lost making its purpose and exact date unclear. Any potential relationship to other prehistoric features to the north is also unclear due to the truncation.	Prehistoric
137	Fill of prehistoric ditch M24-136, cut by later ditches M24-120 and M24-127 and treebole M24-138. Directly underlies cobbled road surface M24-124. May be intentional backfilling during the early Roman period as they carry out large scale remodelling of the landscape to suit their needs.	Pre-Hadrianic
138	Likely a treebole which truncated an earlier ditch M24-136 and then was later cut by ditch M24-120. Not initially visible in plan so north side was overcut during excavation of surrounding features. Fairly irregular sides and base and very shallow, consistent with another treebole to the north. No evidence for the date of this feature.	Unknown
139	Natural infill of a treebole M24-138 which underlies cobbled road surface M24-124 and is cut by drainage ditch M24-120. No evidence for deliberate backfilling of the area so most likely formed over time as the treebole silted up after the tree was gone.	Unknown
140	Cobbled surface to the west of the northern cremations and a series of gullies and ditches cut into the north berm of the *vallum*. Poorly sorted stones packed into a clay surface, seems to be a resurfacing of an earlier cobbled area which may be associated with the road linking Magna and MC46. Broadly aligns with potential boundary ditch M24-101 and may have been laid as part of the entrance into this enclosure.	3rd Century
141	Primary fill of ditch [127]. Anaerobic deposit containing leather shoes, wooden planks, and metal, though this material was mainly in the upper part of the fill and less prevalent than in the overlying deposits. Very soft, spongey texture with frequent inclusions of unworked timber and organic matter. This deposit likely formed over an extended period of time by water flowing into and through the ditch, suggesting that it was not regularly maintained after its initial construction. A matt of hairmoss demarcates the top of this layer, and suggests that it was left exposed for a significant amount of time with standing water, until a smaller recut of the ditch M24-204.	Pre-Hadrianic

Context No.	Description and Interpretation	Provisional Period
142	Clay base of southern *vallum* mound, the counterpart to M24-73 on the north side. Extreme width is likely to indicate the presence of both the marginal and main mound being present in this area although the distinction between the two was not identified during excavation. Overlies the partially preserved historic turf and topsoil M24-123 and an E-W prehistoric ditch at the southern edge of the mound foundation. No surviving turves from the mound's superstructure were found.	Hadrianic
143	A thick layer of peat, up to 72.5cm thick at the southern end of the trench above the solid white boulder clay in this part of the field. Some modern pottery and glass within this context. The trench was opened to look for the continuation of the ditch in context M24-141, 133, but this feature did not extend that far into the field. At the northern end of the trench a cut for a modern red ceramic drain pipe was encountered. This is likely the same east/west drain which runs into the Roman ditch feature M24-127 at the western edge of the field. Locating this pipe quickly filled the trench with over 30cm of water. So the pipe still ran, but its seals were not complete between each section. The trench was dug in the rain on the week of the 14th of July and completely backfilled on the 23rd of July 2024.	Post Medieval
144	Uppermost layer of ash and charcoal from the south end of pyre M24-177. Unlike the rest of the pyre this was not covered by M24-146 and appeared initially as a discrete deposit within the fill of the ditch after the removal of the topsoil. Contained a sherd of Roman pottery but no fragments of burnt bone were recorded, indicating it was not a separate cremation. Same as M24-165, M24-177, M24-167 and M24-168.	3rd Century
145	Same as M24-150.	Hadrianic
146	Fill of ditch M24-150, surrounding and covering pyre M24-177. Likely to have formed in the late 4th century after the cremation cemetery went out of use and the area surrounding the pyre was no longer being maintained. Contains some ash from pyre but otherwise formed through the gradual silting up of the ditch. Material from this area is also likely to have washed into the upper fills of ditch M24-127.	4th Century
147	Cut for a narrow E-W linear immediately to the south of large military ditch M24-127. This is a possible construction cut for a fence or north wall of a timber building, though no organic material survived in the fill. Associated with ditches M24-173 to the west and M24-152 to the east. Much of the construction material recovered from M24-132, M24-133 and M24-141 may have come from this building when it was demolished.	Pre-Hadrianic
148	Fill of potential beam slot M24-147 running E-W immediately south of military ditch M24-127. No surviving evidence of any building materials within this context but it was likely to have been disposed of in the upper fills of M24-127. This was probably an intentional backfilling to level the area after the demolition or removal of the possible building.	Hadrianic
149	Cremation burial set into clay mound M24-169 to the west of ditch M24-150. It contained cremated bone, wood and charcoal. This is the earliest cremation burial in this area and the only one which showed signs of having been buried in a box, having been placed in a deliberate square-shaped cut. Several other cremation burials (M24-156, 157, 157, 172) form a tight cluster around it, all set into the same clay platform. No evidence survived of an above ground marker for the burial.	Late 2nd Century

Context No.	Description and Interpretation	Provisional Period
150	Cut in the SW corner of the trench for pyre M24-177, dug deliberately to contain the pyre. Cuts the south side of pre-hadrianic military ditch M24-127, which would have allowed material from the pyre to be swept/washed away into the larger ditch. Curves slightly as it heads south and the terminus truncates the NW corner of a potential timber building on the south side of M24-127. The cremations in this area are primarily located to the west however a couple are on the eastern edge of it, so doesn't seem to be a boundary enclosing the cemetery area. Exact date is uncertain but has to be in the early to mid-2nd century CE.	Hadrianic
151	Cut for a Roman ditch, possibly the eastern construction cut for a building related to M24-147. It may also have been a drainage ditch leading into M24-127. A 19th century field drain was cut through the Roman ditch, going N-S through the trench, obscuring some features of the earlier ditch and its relationship to M24-147. Continues to the south beyond the excavation area.	Pre-Hadrianic
152	Mixed post-medieval and Hadrianic backfill of ditch M24-151. A 19th century field drain was inserted into the pre-existing Roman ditch, contaminating the fill and obscuring its relationship with ditch M24-147. May have formed one side of a timber building on the south side of ditch M24-127, with the beam slot silting up after the removal of the timber structure. Dating evidenced by Roman pottery within backfill, however there has been significant later interference with the context meaning it is not stratigraphically secure.	Post Medieval
153	Short gully running N-S cut into the north berm of the *vallum*, associated with a series of gullies and ditches dug in this area in the later Roman period, indicating later reuse of the space. Immediately southeast of a cluster of cremation burials dating to the 3rd century CE. Cuts the western end of gully M24-74 but terminates before crossing larger ditch M24-101 to the south. The purpose of this gully is uncertain, but it may be a beam slot for one side of a timber building as it forms two sides of a square with gully M24-74.	3rd Century
154	Fill of gully M24-153 on the north berm of the *vallum*. No evidence of intentional backfilling, this likely formed after the gully had fallen out of use and silt gradually built up in the cut. Very similar to M24-75, the fill of the adjacent E-W gully, and both deposits likely formed at the same time.	3rd Century
155	Cut for the *vallum* ditch, running NE-SW in this part of the site as part of the diversion. Shallower than some other recorded sections of the *vallum*, this is likely due to its proximity to the crossing point carrying the road from Magna to MC46 (which evidence suggests is immediately west of the excavated area). U-shaped ditch with steep sides and a rounded base, no evidence of an 'ankle breaker' or similar having been dug in the base. Sides are likely to have been eroded over time, especially on the north side due to the topography of the field, reducing the depth and steepness of the sides. Cut by a modern field drain on the north side along with several later Roman gullies which were likely draining the area to the north. Only fully excavated in a small section due to ground conditions.	Hadrianic

Context No.	Description and Interpretation	Provisional Period
156	Cremation burial on top of clay mound M24-169. Located to the north of cremation M24-149 and is the westernmost burial in a tight cluster of cremations (M24-149, 157, 158, 172). Contained burnt bone, charcoal and ash. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial.	Late 2nd Century
157	Cremation burial on top of clay mound M24-169. Located to the east of cremation M24-149 and is part of a tight cluster of cremations (M24-149, 157, 158, 172) less 30cm from one another in this area. Contained burnt bone, charcoal and ash. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial.	3rd Century
158	Cremation burial on top of clay mound M24-169. Located to the north of cremation M24-149 and is part of a tight cluster of cremations (M24-149, 157, 156, 172) less 30cm from one another in this area. Contained burnt bone, charcoal and ash. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial.	3rd Century
159	Cut of ditch M24-127. Truncated by insertion of modern field drain running N-S on eastern edge of the trench and thus initially thought to be a separate ditch.	Pre-Hadrianic
160	Same as M24-132. Cut by a modern field drain running N-S on the eastern trench edge.	Hadrianic
161	Pocket of ash and burnt bone associated with pyre M24-165 to the east. Separate from the main block of the pyre and likely formed by the spreading of the material, either intentionally by raking or by weathering. Associated with ash dump M24-162 to the east, both of these were separate from the other cremation deposits and may have been deposited at similar times. Number issued as originally identified as a cremation.	3rd Century
162	Pocket of ash and burnt bone associated with pyre M24-165. Separate from the main block of the pyre and likely formed by the spreading of the material, either intentionally by raking or by weathering. Associated with ash dump M24-161 to the west, both of these were separate from the other cremation deposits and may have been deposited at similar times. Number issued as originally identified as a cremation.	3rd Century
163	Cut for a curvilinear ditch underlying subsoil M24-119 south of the *vallum's* south mound. Cut by post-medieval drainage ditch M24-120 then overcut for 2.5m immediately to the north of this ditch. This may be a continuation of ditch M24-136 to the south however the truncation by the later ditch makes this uncertain; if the two are the same then the length of the ditch is over 10m. Follows a N-S alignment north from ditch M24-120 before curving to the east and continuing beyond the eastern trench edge. This is very similar to the shape of the Iron Age ditch M24-26 excavated south of MC46 and is likely to also be prehistoric in date.	Prehistoric

Context No.	Description and Interpretation	Provisional Period
164	Fill of prehistoric curvilinear ditch M24-163. This is likely an intentional backfill during the early Roman period, evidenced by Roman CBM within the context, during wider remodelling of the landscape and may be related to the construction of ditch M24-127. Truncated by post-medieval drainage ditch M24-120 but may be the same as M24-137.	Pre-Hadrianic
165	Number issued as originally identified as a cremation. Oblong deposit of compacted charcoal, ash and burnt rosewood in the base of cut M24-150. Remains of a pyre associated with both clusters of cremation burials. In use from the 2nd – mid-4th century CE for multiple burials, suggesting a continuity of burial customs separate to the expected main cemetery of Magna. Underlies M24-146, which formed after the pyre went out of use. Some material from the pyre has spread into the surrounding fill, forming pockets of ash and charcoal. Same as M24-144, M24-177, M24-167 and M24-168.	3rd Century
166	Turf and topsoil overlying the well mound and surrounding area. Fundamentally the same as the topsoil across the rest of the north field. Regular finds of post medieval material throughout associated with Carvoran farm. Overlies the subsoil M24-175. Frequent deep roots from reeds and grasses.	
167	Pocket of ash and burnt bone associated with pyre M24-177 in ditch M24-150. More diffuse than the main block of the pyre and likely formed by the spreading of the material from the main block over time, either intentionally by raking or by weathering. Within M24-146, which formed after the pyre went out of use. Same as M24-144, M24-177, M24-165 and M24-168. Number issued as originally identified as a cremation.	3rd Century
168	Number issued as originally identified as a cremation. Oblong deposit of compacted charcoal, ash and burnt rosewood in the base of cut M24-150. Remains of a pyre associated with both clusters of cremation burials. In use from the 2nd – mid-4th century CE for multiple burials, suggesting a continuity of burial customs separate to the expected main cemetery of Magna. Underlies M24-146, which formed after the pyre went out of use. Some material from the pyre has spread into the surrounding fill, forming pockets of ash and charcoal. Same as M24-144, M24-177, M24-167 and M24-165.	3rd Century
169	Clay platform to the west of ditch M24-150. 7 cremations (M24-149, 156, 157, 158, 161, 162, 172) were placed on the platform, often as commemorative deposits with no associated cuts. The platform is likely associated with the creation of the cemetery area and could originally have been part of a path to reach the pyre site before the burials were placed. Alternatively, it could have been built as a platform to designate the place for the burials.	Late 2nd Century
170	Cremation burial on the eastern edge of ditch M24-150, containing burnt bone, charcoal and ash. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial. Second cremation burial M24-171 was immediately to the south of this, with this pair being the only two burials to the east of the pyre M24-177.	3rd Century

Context No.	Description and Interpretation	Provisional Period
171	Cremation burial on the eastern edge of ditch M24-150, containing burnt bone, charcoal and ash. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial. Second cremation burial M24-170 was immediately to the north of this, with this pair being the only two burials to the east of the pyre M24-177.	3rd Century
172	Cremation burial on top of clay mound M24-169. Located northeast of a tight cluster of cremations (M24-149, 156, 157, 158) and to the west of ditch M24-150. Contained burnt bone, charcoal and ash as well as a hobnail. Material was originally buried in some form of organic container, a leather or cloth bag possibly, as the remains form a discrete bundle as opposed to a diffuse spread. No evidence survived of any above ground marker for the burial.	3rd Century
173	A thin and linear cut to the immediate east of clay platform M24-169 and its associated cremations to the south of ditch M24-127. This cut is shallow and continues beyond the limit of excavations to the south. The feature is cut into the natural boulder clay and is likely associated with ditches M24-147 and M24-152, forming beam slots for three sides of a timber building. Truncated at its northern end by later ditch M24-150 which removed any potential relationship between this ditch and M24-147.	Pre-Hadrianic
174	Grey wet and silty fill of ditch M24-173, a potential beam slot for a pre-Hadrianic timber building associated with ditches M24-147 and M24-152. Cut by ditch M24-150 at its northern end, removing any potential relationship with M24-147, and partially overlain by M24-169 to the west. This fill likely would have formed in the Hadrianic period after the demolition of the timber building and before the formation of the cremation cemetery and its associated features.	Hadrianic
175	No discernible difference between topsoil and subsoil in this area after excavation. This context is the same as M24-166.	
176	Diffuse spread of ash and burnt bone to the west of ditch M24-150. Likely associated with pyre M24-177 and may have been caused by raking the pyre after a cremation. Some burnt bone within the upper part of the deposit but overall very few bones throughout suggesting this is an ash dump rather than a cremation burial. Mound possibly man made as a result of â€˜bone fever'.	3rd Century
177	Oblong deposit of compacted charcoal, ash and burnt rosewood in the base of cut M24-150. Remains of a pyre associated with both clusters of cremation burials. In use from the 2nd - mid 4th century CE for multiple burials, suggesting a continuity of burial customs separate to the expected main cemetery of Magna. Underlies M24-146, which formed after the pyre went out of use. Some material from the pyre has spread into the surrounding fill, forming pockets of ash and charcoal. Same as M24-144, M24-165, M24-167 and M24-168.	Late 2nd Century
178	Laminated layer of charcoal and ash to the west of ditch M24-150. No associated bone or evidence of a cremation burial suggesting this is an incidental spread of charcoal and ash, likely from the pyre or possibly in relation to the nearby cremations to the west. Overlies M24-186, and may be part of the fill of pit M24-185.	Late 2nd Century

Context No.	Description and Interpretation	Provisional Period
179	Uppermost fill of well M24-180. Likely to be very recent as overlies a modern metal pipe inserted into the side of the well 0.85cm below the top course. Contains occasional stones which have collapsed in from the lining of the well. Similar to the topsoil covering the surrounding mound.	Post Medieval
180	Drystone lining of a post-medieval well, built inside cut M24-224 and associated with timber frame M24-219. Pre-excavation the top course was visible exposed on a significant mound in the field, standing approximately 1.2m above the surrounding field turf surface. Upper courses of stone are disturbed and collapsing outwards, this is most visible on the south side of the well where a modern metal pipe has been inserted 0.85m below the top course. Variety of sizes of stones have been used to form the well, but all have been roughly dressed on the inner face to form a circular inner wall for the well. Lower courses of stones have been stained from the surrounding peat and minerals in the soil.	Post Medieval
181	Uppermost layer of the mound surrounding well M24-180, made of orangey-pink pebbly clay, probably created by the debris from the digging of the well. Directly below M24-166, and overlying the surrounding peat bog along with a secondary layer of clay M24-213. This material is very similar to the natural boulder clay seen elsewhere on the site and contained very few finds, most finds recovered came from the initial cleaning of the surface and could have been incidental from after the creation of the mound.	Post Medieval
182	Peaty soil which has organically formed in the bog surrounding the well. This layer has most likely formed in the post-medieval period and has now lost almost all organic preservation. Evidence of subsidence in the area and desiccation as the peat is dry and a clay drainage pipe inserted into this material is now at a very shallow depth, of only 11cm. It has warped and bent as the material it is set into has cracked and moved with subsidence rendering the drain useless.	Post Medieval
183	Linear cut through the clay mound M24-181 surrounding the well on the south side, leading to the section of collapsed stones in the upper courses of M24-180. Probably modern reuse of the well structure associated with the insertion of a metal pipe into the side of the well. At the south end of the ditch two later rubbish pits M4-192 and M24-194 were cut in, truncating the end of the ditch.	Post Medieval
184	Fill of modern ditch M24-183 cut into the south side of the well mound. This was intentional backfilling of the cut, likely after the laying of a modern metal pipe attempting to re-use the well, and there was frequent modern rubbish disposed of throughout. Two later modern rubbish pits M24-192 and M24-194 truncate the ditch at its south end.	Post Medieval
185	Irregular sub oval depression to the west of the pyre M24-177. May be a cut feature but likely just a depression in the cobbled surface leading to the irregular shape. Filled by M24-186, which contained frequent charcoal and ash. No obvious purpose for this pit and may not be a deliberately cut feature.	Late 2nd Century

Context No.	Description and Interpretation	Provisional Period
186	Fill of possible pit M24-185, likely caused by raking pyre leftovers into the cut or depression. This deposit contains infrequent bone and frequent charcoal throughout and may. It is located just west of the pyre M24-177 and just below clay bank M24-169, suggesting this may be remains from earlier cremations prior to the formation of the clay bank.	Late 2nd Century
187	Spread of poorly sorted rubble over the southern side of the well mound M24-181. It continues south across M24-182 towards the farm and overlies parts of Victorian wall foundation M24-197. This may have been laid to create a path leading from Carvoran to the well, improving access across the surrounding boggy ground. Frequent finds of pottery and other rubbish amongst the stones suggesting it was made from whatever was available at the time.	Post Medieval
188	A less disturbed layer of peat which is below the impact zone for the creation of the nearby well and its platform, and therefore also further away from 18th century drains, and more modern farming interference. This context is almost pure organic peat, very spongy, but it has some Roman material within its fabric, including a samian rim sherd. Along the north edge of the trench a large amount of horse manure, M24-203, had been dumped into the bog during the formation of this layer, suggesting some Roman activity in this area.	3rd Century
189	Lower backfilll of the *vallum*, probably the first intentional backfill of the *vallum*. Overlies the redeposited natural/silting deposit M24-200. Relatively deep deposit with sods of degraded turf throughout, though not in the concentration seen in M24-90 so it is unlikely these turves have come from the north/south mounds. Roman roof tiles found within this deposit which probably came from the milecastle, as the nearest confirmed Roman structure, suggesting this deposit may have formed in the late Roman period as the milecastle falls out of use. Not traditionally anaerobic soil but was waterlogged enough to preserve organic material, primarily small pieces of wood and plants but also a Roman leather shoe.	4th Century
190	Discrete dump of pebbly clay within the backfill layer M24-189, this material is very similar to the natural boulder clay. Only present in the NE part of the excavated section, this material likely came from a one-off collapse of the side or dumping of excess clay from the activity on the north berm. Contained Roman roof tile suggesting that this deposit is also from the late Roman period (like M24-189) when the milecastle is falling out of use.	4th Century
191	This context is the clay below ditch cut M24-183. The context is still mottled, disturbed and soft, but better stratified than the fill of the ditch. The clay has been cut through by two oval pits (M24-192 and 194) which have been filled with post medieval debris, including slag, a small tyre, glass and glazed pottery. While the pits are clearly modern, the clay layer might be post medieval. It may have been associated with the construction of the well M24-180 and upcasting of the geological clay which formed the surrounding mound M24-181.	Post Medieval

Context No.	Description and Interpretation	Provisional Period
192	This context is the cut of a large oval pit, filled with slag, charcoal and modern debris. The pit is hard to see in section but the edges are composed of clay M24-191. The pit was cut into the south end of ditch M24-183 before fill M24-184 was deposited. This is a modern rubbish pit likely associated with the final attempt to re-use the well as a water supply for Carvoran farm.	Post Medieval
193	Fill of large pit M24-192, at the south end of ditch M24-183. The fill was deposited while the ditch was still open and then later covered by M24-184. Contains a high amount of slag along with with modern debris and rubbish. Associated with another modern rubbish pit to the south, M24-194.	Post Medieval
194	Cut of smaller oval pit, to the south of M24-192. The pit is cut through mottled soft clay and is post-medieval in nature, as evidenced by finds of clay pipe, a small tyre, and post-medieval blue and white pottery. Likely used as a rubbish pit during the final use of the well and surrounding area by Carvoran farm.	Post Medieval
195	Fill of smaller rubbish pit, to the south of M24-192. The pit is shallow, but its edges are clear and it is filled with early modern debris including fragments of rubber tyre, a lead pipe and lots of fragments of agricultural iron. Cut through the south end of ditch M24-183 while it was still open before being covered by backfill M24-184.	Post Medieval
196	Below the clay mound surrounding the well, this context is a layer of turves carefully stacked so that the grass faces upwards. It is covered by peaty soil M24-214 in the centre of the mound and at the edge sits immediately below the pink clay M24-181. The turf terminates on peat layer M24-188/M24-216. The reason for the laying of these turves is unclear but is likely to have happened in the late Roman or immediately post Roman periods on site.	4th Century
197	The foundation courses of a dry stone wall running E-W along the south edge of the trench. At its east end the wall turns to the south forming a rounded corner of a rectilinear structure. The continuation of the walls can be seen under the surrounding turf. It is buried below a spread of cobbled stones M24-187 which covers the northern wall of the feature. Victorian pottery found in association with the structure, dating it, and it may have been a boundary wall enclosing part of the farmyard such as an orchard.	Post Medieval
198	Cut for field drain in western part of trench which cuts through the west edge of the well mound M24-181. On the northern LOE, the pipe is only 10cm below the grass and the pipe itself is also quite bumpy between individual segments. This demonstrates the peat degradation since the pipe was inserted in the mid-1800s as it is likely that the pipe was originally placed into the ground at a depth between 1-2m.	Post Medieval
199	Fill of field drain cut, surrounding ceramic pipe segments. On the northern LOE, the pipe is only 10cm below the grass and the pipe itself is also quite bumpy between individual segments. This demonstrates the peat degradation since the pipe was inserted in the mid-1800s as it is likely that the pipe was originally placed into the ground at a depth between 1-2m.	Post Medieval

Context No.	Description and Interpretation	Provisional Period
200	Redeposited natural sediment in the base of the *vallum*, overlying a thin layer of peat in the deepest part of the ditch. This deposit probably formed throughout the 2nd and 3rd centuries CE after the construction of the *vallum* until the first intentional backfilling of the cut with M24-189. Created by clay and material being washed into the ditch from the surrounding area, but may also contain collapsed material from the edges of the *vallum* and clay dug out to create the ditches on the north berm in the 3rd century CE.	Late 2nd Century
201	Primary fill of the *vallum*, only present in the lowest part of the cut as a very thin layer. This is pure peat with lots of organic material preserved within it, and probably formed immediately after the *vallum* was dug from organic debris from the surrounding landscape that washed into the ditch. It is very likely the *vallum* always had an amount of standing water in the base meaning this would have been below the water table within the ditch. Only visible in E facing section.	Hadrianic
202	Discrete deposit of horse manure that was dumped into the peat M24-207 during the Roman period. Spongey laminate of organic material, primarily grasses and hay visible. One of several such deposits visible within this layer of the peat bog, excavated as a representative of the material. No evidence for an associated cut suggesting the material was just tipped out into the bog and has been compressed down into the peat over time. Closely associated with several large sheets of silver birch bark which taken together could be tentative evidence for leather tanning being carried out.	Late 2nd Century
203	Large dump of Roman horse manure along the north edge of the trench. Deposit appears linear but continues to the north beyond the excavation area so it's true size and shape are unclear. Material is not filling a cut feature and instead has been dumped into the peat M24-188 in this area. Several other dumps of horse manure were recorded as present in the lower layer of the bog, M24-207, where they may be associated with leather tanning being carried out. Beyond this deposit there is no other evidence for tanning in this layer but horse manure was still occasionally being dumped into the bog.	3rd Century
204	This context is the cleaning recut of ditch M24-127, where a bed of hairmoss had grown, filling up the original profile of the ditch. The context was recorded in the east facing section (DSC_0202, looking west) and appears to be smaller than the original ditch, u shaped and filled by anaerobic peat M24-133. This recut demonstrates more than one phase of use in this ditch, perhaps a period of disuse and subsequent waterlogging followed by a reopening. Both the primary and secondary fill and cut do not show an abundance of finds.	Pre-Hadrianic
205	Turf and topsoil overlying both trenches in the area NE of Wall-e. Fundamentally the same as the topsoil across the rest of the north field. Regular finds of post medieval material throughout associated with Carvoran farm. Overlies the subsoil M24-206 and peat M24-143. Frequent deep roots from reeds and grasses.	

Context No.	Description and Interpretation	Provisional Period
206	Subsoil underlying topsoil M24-205 in second trench in the area NE of Wall-e. Not present in first trench dug in this area. Still some roots penetrating into this layer and cut by later field drains. Wall M24-211 built into this deposit.	
207	Peat layer surrounding and under the well mound, Roman in date and underlying M24-188. Adjacent to M24-215 immediately to the north which is differentiated by a high density of bracken, hair moss and woody material throughout it. M24-202 is contained within this layer along with several other deposits of horse manure. None of these have associated cuts so the material has just been dumped into the bog during the formation of this layer of peat. Several areas of silver birch bark were recorded within this layer; there is no associated silver birch timber, only large sheets of the bark. This combined with the horse manure may be ephemeral evidence of leather tanning happening here, the adjacent ancient lake would have provided the water source. Two timber posts were found in this layer along with possible floor M24-222 south of the well but weren't fully investigated due to flooding.	Late 2nd Century
208	Cut for a wide, shallow e-w ditch running through the second trench in the area NE of wall-e. Only major archaeological feature in this area, cut through a layer of clayey silt M24-218. Relatively shallow ditch with a flat base, comparable to other Iron Age ditches excavated further to the west (M24-26). May be part of an Iron Age enclosure system for a farmstead or similar, would not have been defensive due to the shallow depth and flat base so more likely demarcating boundaries. Filled by M24-209 and M24-210.	Prehistoric
209	Primary fill of ditch M24-208, a yellowish brown clayey silt along the north edge of ditch. Very similar to surrounding silt M24-218 that the ditch has been cut through and contains occasional small chunks of fired clay. Most likely formed by surrounding silt and clay being washed into the ditch from upslope, explaining the presence of this context along the north edge of the ditch only. Suggests the ditch was not maintained for very long after its construction with the gradual silting up being allowed to happen.	Prehistoric
210	Dark peaty fill in centre and on the south edge of ditch M24-208, overlying the primary fill M24-209. Not fully peat or part of the bog further to the south but very dark with organic material preserved within it. Occasional sherds of Roman pottery within it suggesting the ditch was finally backfilled during the Roman occupation of the site though there is no other evidence of Roman activity within this trench. This may indicate the furthest extent of the bog during its formation in the Roman period, before it receded by a few metres to its current extent.	Late 2nd Century
211	Packed rubble foundation for a N-S running wall crossing the full length of the trench. Constructed in the subsoil and overlying all other features within the trench so most likely dates to the 19th century and associated with Carvoran farm. Unclear what sort of structure this would have been but given the size it would not have been a large wall, may have been a sheepfold or similar. Similar to the material underlying wall M24-197 so most likely supported a drystone wall.	Post Medieval

Context No.	Description and Interpretation	Provisional Period
212	Backfill of the construction cut for well M24-180. Infills the space between the stone built well and the wider construction box cut, surrounding the timber frame. Frequent finds of post-medieval pottery, glass and metal in the upper parts of this material but significantly less in the lower layers of the deposit. Composed of silty clay and large pieces of stone rubble, likely leftover from building the drystone well, with the deposit becoming wetter and more peaty in the lower layers. Not fully excavated due to safety constraints.	Post Medieval
213	White clay layer underneath clay mound M24-181. This deposit appears to have the same roughly circular shape surrounding well M24-224 as the overlying mound but is smaller in diameter. This is likely to have also been deposited by the dumping of material excavated out of the well onto the surrounding bog as it overlies all peaty deposits. As the base of the well was not reached it is uncertain what type of clay it is cut into but this deposit and the overlying clay would suggest it was dug through at least two bands of natural clay.	Post Medieval
214	Peaty soil directly beneath clay well mound M24-181. This layer has most likely formed in the post-medieval period and is the same as M24-182 which surrounds the mound. Unlike the surrounding deposit this material has not desiccated and retains a good level of organic preservation, including some bracken and hair moss. This is due to the overlying clay acting as a protective cap, maintaining the anaerobic conditions.	Post Medieval
215	Roman peat containing lots of hair moss, bracken, and branches concentrated in the upper part of the deposit. Lots of woody materials throughout. This layer lies immediately north of M24-207 and the two are stratigraphically contemporary however this deposit doesn't contain the same bark and horse manure that defines M24-207. Series of four rocks in the north trench edge mark the base of the context, these rocks seem purposely placed but were not further investigated due to time constraints and flooding.	Late 2nd Century
216	Roman peat with pockets of horse dung towards the base of the context. These may be associated with M24-207 below which has much more frequent amounts of horse dung recorded throughout it. No finds recovered but is the same as Roman peat layer M24-188 surrounding the mound, both compositionally and stratigraphically. As with M24-214, this layer has been well preserved due to the overlying clay acting as a protective cap reducing the impacts of desiccation on this deposit.	3rd Century
217	Clay lens similar to M24-213 in colour and texture. Underlies peaty layer M24-214 but was only present towards the centre of the clay mound. Cause of this lens is unclear but it could possibly have been caused by leaching in the soil or as a byproduct of the construction of the well disturbing the stratigraphy in this area.	Post Medieval
218	Spread of clayey silt across whole trench area, underlying subsoil and sitting above the natural. Ditch M24-208 is cut through this material, but no evidence for it having been deliberately deposited. Very similar to the primary fill of the ditch M24-209 suggesting a similar formation process, this deposit is likely hillwash that built up over time in the area. No finds except occasional fired clay chunks, which suggests people were present in this landscape during the formation of the deposit. Cut by two modern field drains.	Prehistoric

Context No.	Description and Interpretation	Provisional Period
219	Wooden box frame built to brace the construction cut M24-224. Consists of long horizontal cross bars on each side of the cut, held in place by a series of shorter vertical posts. All the timber has been stripped of their bark, indicating they aren't Roman, and the majority have been worked to some degree with half lap joints and pointed end on the vertical posts. Seems likely to have been constructed in stages as the cut was excavated which explain the use of repeated rows of shorter posts for the vertical timbers rather than single long planks that could only have been placed once it was fully excavated. Lower layers of the structure are better preserved where they were set against peaty soils below the water table.	Post Medieval
220	This is the lower of two fills for stone well M24-180. It is formed entirely of whinstone and so is an intentional backfilling of the well done in the mid-20th century using material from Walltown quarry, likely at the same time as the infilling of the *vallum* with this material. This fill has a minimum depth of 3.36m, the base of the well and therefore this context was not reached due to safety constraints.	Post Medieval
221	Layer of lighter clay with very frequent cobbling throughout between the geological boulder clay and silt layer M24-218. Only seen as a distinct layer in the NE corner of the trench but may just be an extended interface between M24-218 and the natural.	Prehistoric
222	Small square of potential laminate flooring material comparable to that used within Roman timber buildings at Vindolanda. Made of layers of organic material tightly compacted together to form a thick, firm matt. Found close to two upright posts set into the bog which indicate there might have been a small structure or working platform in this area, associated with the potential leather tanning. Cut by post-medieval field drain M24-198. M24-222 and surrounding area were not fully excavated due to extensive flooding.	Late 2nd Century
223	Lowest layer of the peat bog likely formed in the prehistoric times as evidenced by the presence of a post in the northwest corner. Lots of fibrous and woody material within the peat, but no finds recovered. Sits on top of two distinct natural silty clay sediments, both approximately 15cm in depth, before coming to the lakebed sediment which is 13cm in depth. Natural boulder clay is underneath the lakebed sediment (natural sediment measurements taken from a 30x30cm sondage). Only excavated in the NW corner of the trench due to flooding.	Prehistoric
224	Square cut for the construction of well M24-180. The walls of the cut have been supported by timber frame M24-219 during its excavation. The cut was dug larger than the intended size of the well, most likely to allow space for the workers to build the well up, and was dug down through the bog and into the underlying boulder clay. The excavated material has been cast out of the cut to form surrounding mound M24-181. Not fully excavated due to safety constraints.	Post Medieval

APPENDIX 2: SMALL FINDS

Human remains, including the skeleton from the 2023 excavation, have been given both a small find number (MSF) and a skeleton number (MSK) for accessioning purposes.

Small Find No.	Context No.	Description
MSF34	M24-1	gold-in-glass bead
MSF35	M24-1	Lead weight
MSF36	M24-34	Iron helmet cheek piece?
MSF37	M24-53	Glass bead
MSF38	M24-1	Flint arrowhead
MSF39	M24-46	Glass bead
MSF40	M24-42	Iron chisel
MSF41	M24-42	Copper rod
MSF42	M24-128	Iron knife
MSF43	M24-133	Antler cup
MSF44	M24-133	*Lorica squamata*
MSF45	M23-071	Skeleton MSK1
MSF46	M24-99	Cremation MSK2
MSF47	M24-103	Cremation MSK3
MSF48	M24-105	Cremation MSK5
MSF49	M24-132	Copper finger ring
MSF50	M24-166	Iron buckle
MSF51	M24-166	Iron blade
MSF52	M24-166	Iron bolt
MSF53	M24-133	Gaming counter
MSF54	M24-188	Glass bead
MSF55	M24-184	Knife blade
MSF56	M24-189	Tile with paw print
MSF57	M24-182	Copper Alloy strap?
MSF58	M24-117	Cremation MSK4
MSF59	M24-149	Cremation MSK6
MSF60	M24-156	Cremation MSK7
MSF61	M24-157	Cremation MSK8
MSF62	M24-158	Cremation MSK9
MSF63	M24-170	Cremation MSK10
MSF64	M24-171	Cremation MSK11
MSF65	M24-172	Cremation MSK12

Small Find No.	Context No.	Description
MSF66	M24-84	Cremation MSK13
MSF67	M24-205	Gaming counter
MSK2	M24-99	Cremation <43>
MSK3	M24-103	Cremation <44>
MSK4	M24-117	Cremation <53>
MSK5	M24-105	Cremation <45>
MSK6	M24-149	Cremation <71>
MSK7	M24-156	Cremation <72>
MSK8	M24-157	Cremation <73>
MSK9	M24-158	Cremation <74>
MSK10	M24-170	Cremation <80>
MSK11	M24-171	Cremation <81>
MSK12	M24-172	Cremation <82>
MSK13	M24-84	Multi-person cremation pit
ML2024-1	M24-133	Partial shoe
ML2024-2	M24-133	Child's shoe
ML2024-3	M24-133	Leather sheet
ML2024-4	M24-133	Child's shoe
ML2024-5	M24-133	Shoe upper
ML2024-6	M24-141	Shoe sole
ML2024-7	M24-133	Scrap leather
ML2024-8	M24-133	Shoe
ML2024-9	M24-141	Shoe
ML2024-10	M24-189	Shoe
ML2024-11	M24-133	Scrap leather
ML2024-12	M24-141	Scrap leather
MW2024-1	M24-133	Peg
MW2024-2	M24-133	Block
MW2024-3	M24-133	Stake
MW2024-4	M24-133	Barrel stave?
MW2024-5	M24-141	Peg
MW2024-6	M24-141	Plank
MW2024-7	M24-141	Plank
MW2024-8	M24-141	Bucket stave
MW2024-9	M24-141	Plank
MW2024-10	M24-141	Plank
MW2024-11	M24-141	Worked wood
MW2024-12	M24-188	Bark shingles?

APPENDIX 3: FABRICS

Class A

I. A1 – Dressel 20

II. A2 – Reddish orange surfaces with a brownish orange core. Inclusions: abundant mica and sparse to moderate quartz.

Class B

I. BB1

II. BB2

III. BBS: a series of imitation fabrics, emulating the Black Burnish surface. The fabric may range from dark grey to quartz abundant BB1 like.

Class F

I. Colour-coated wares F1

F101 – LNV CC Nene Valley Colour Coated

F102 – KOL CC Cologne Colour Coated

F103 – CNG BS Central Gaulish Black Slipped

F104 – A series of unknown colour-coated fabrics defined by pale brown margins and pale brown coated surface.

II. Painted Wares F2

LNV PA? Buff white surfaces; rusty brown margins and light core, some mica inclusions and moderate to abundant white inclusions <1mm. Surface is red painted decorated.

III. Reduced finewares F3

A series of black coated fabrics with thin light grey margins and a dark brown core.

IV. Miscellaneous F4

Thin-walled very quartzy, not fine fabric, thin walled. Pale brown creamy white surface. Indented.

Class G

I. Calcite and calcareus G0

This category designates the calcite-gritted Ware.

II. Quartz and stone G1

A series of fabrics defined by abundant presence of quartz and stone in their core and surface.

III. Miscellaneous organic G2

A series of fabrics containing organic inclusions, outside the calcite-gritted ware.

Class M

I. Oxidised M0

Mortaria with oxidised fabrics.

II. White/Parchment M1

Mortaria with white parchment fabric.

Class O

I. Calcareous: O0

A series of fabrics typically orange in surface, with a rough, calcareous feel to them or containing white calcareous inclusions.

II. Parchment/White surface O1

A series of fabrics typically white/parchment with light brown pale surface and a powdery feel.

III. Clean O2

A series of fabrics typically orange and without any inclusions.

IV. Red iron O3

A series of fabrics typically orange and containing red inclusions in the fabric and on the surfaces.

V. Quartz O4

A series of fabrics defined by quartz inclusions into their fabric as the main feature.

Class R

I. Light greywares R0

A series of miscellaneous fabrics defined by light grey surfaces

II. Darkened surfaces- coarse jars R1

A series of miscellaneous fabrics defined by black or reduced darkened surfaces, very coarse, originating from large jars.

III. Darkened surfaces- miscellaneous R2

A series of miscellaneous fabrics defined by black or reduced darkened surfaces and could not be identified from which morphological form they originate.

IV. Thin-walled reduced R3

A series of fabrics defined by thin walls which appear fine, yet they have a coarse fabric.

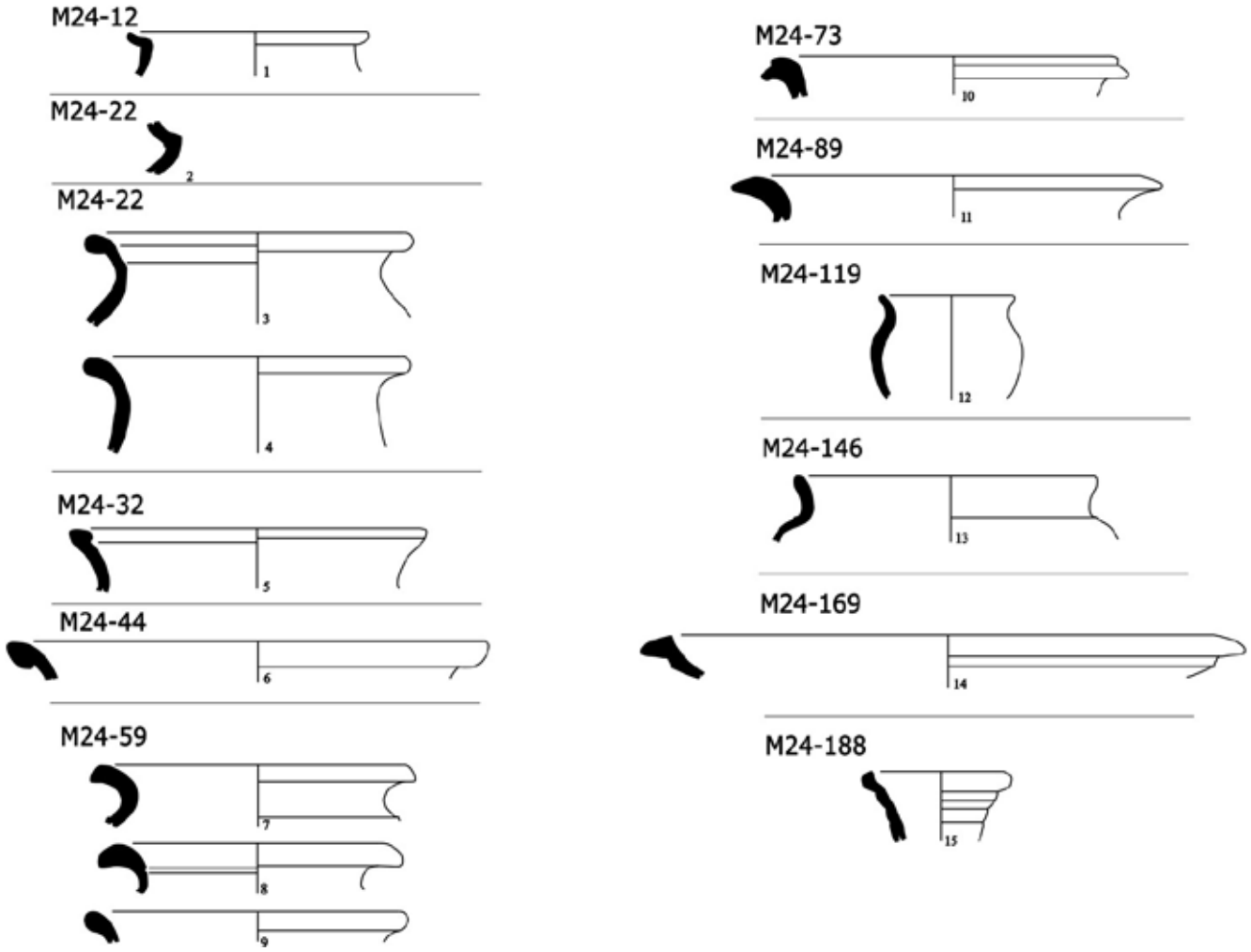
APPENDIX 4: OVERALL FABRIC DISTRIBUTION ACROSS CONTEXTS

Fabric class	Fabric 1	Fabric 2	Context Date	Context Number
A	A1	Dressel 20	Pre-H	3, 18, 54
			Early 2nd c.	15, 128, 132
			Late 2nd c.	169, 207, 210, 215
			3rd c.	188
			4th c.	119, 146
	A2	-	Early 2nd c.	15
B	BB1	BB1	Pre-H	3, 27, 133, 141
			Early 2nd c.	14, 15, 44, 73, 128, 132, 150
			Late 2nd c.	22, 30, 37, 46, 51, 207, 210, 215
			3rd c.	12, 72, 75, 79, 82, 86, 95, 96, 97, 102, 103, 108, 117, 165, 188
			4th c.	59, 119, 146
	BB2	BB2	Early 2nd c.	44, 150
			Late 2nd c.	169, 207
			3rd c.	12, 79, 102, 188
			4th c.	119
	BBS	-	Late 2nd c.	22, 207
			3rd c.	12, 102, 188
F	F1	F101	Late 2nd c.	22, 60, 89, 169, 215
			3rd c.	12, 86, 188
			4th c.	59
		F102	Pre-H	27
		F103	Early 2nd c.	132
			4th c.	124
		F104	Pre-H	3, 33, 133
			Early 2nd c.	21, 44
			3rd c.	86, 102, 108
	F2	-	4th c.	119
	F3	-	Late 2nd c.	46
			4th c.	59
	F4	-	Prehistoric	223
G	G0	-	4th c.	59
	G1	-	Early 2nd c.	44
			Late 2nd c.	22, 169, 207
			3rd c.	165

Fabric class	Fabric 1	Fabric 2	Context Date	Context Number
			4th c.	32, 59
	G2	-	Pre-H	27
			Early 2nd c.	44
M	M0	-	Early 2nd c.	132
	M1	-	Pre-H	3, 133
			Early 2nd c.	44, 128, 132
			Late 2nd c.	22, 46, 207
			3rd c.	12, 188
			4th c.	59, 119
O	O0	-	Pre-H	3, 141
			Early 2nd c.	132, 148
	O1	-	3rd c.	86, 188
	O2	-	Pre-H	133
			4th c.	50, 146
	O3	-	Pre-H	133
			3rd c.	165
	O4	-	Pre-H	65, 133
			Early 2nd c.	132
			3rd c.	86, 188
			4th c.	70, 113, 119
R	R0	-	Pre-H	27, 65, 139
			Early 2nd c.	14, 73, 128, 132
			Late 2nd c.	169, 207
			3rd c.	72, 86, 102, 108, 165, 188
			4th c.	59, 119
	R1	-	Pre-H	133
			Early 2nd c.	14, 44, 132, 174
			Late 2nd c.	4, 89
	R2	-	Prehistoric	31
			Pre-H	133, 141
			Early 2nd c.	15, 128, 150
			3rd c.	12, 144, 165
			4th c.	119, 146
	R3	-	Pre-H	133
			Early 2nd c.	128, 132
			3rd c.	12, 108
			4th c.	119

APPENDIX 5A: FORM CATALOGUE-DRAWINGS

Some of the key forms or less recognisable ones have been drawn and sorted based on context, in order to enhance the understanding on the pottery consumption in each stratigraphic layer. This approach is contextual and aims to provide a more complete picture on the pottery consumption combinations. For a full catalogue of identified form types, see Appendix 5B.



APPENDIX 5B: FORM CATALOGUE-FORM TYPES

The second part of Appendix 5 presents the rims exhibited in Appendix 5A. The first column represents the catalogue number, the second column indicates the form class and form type. Finally, the last column provides a brief description of the rim, which includes a form class, morphological features and a provisional date range.

Context No	Form type	Fabric	Description	Date
12	HS.M24	M1	Rim sherd from a hammerhead *mortarium*	Mid-3rd – mid-4th c.
	Cat. No. 1	BBS	Rim sherds of a lid-seated jar	3rd c.?
	Gillam83	F101	Rim sherd of a Nene Valley colour-coated beaker	260-320 CE
14	Cat. No. 2	R1	Incomplete profile of a lid-seated jar. Pre-Derbyshire prototype? Incomplete profile	Early 2nd c.?
21	Gillam89	F104	Wall sherd of a rouletted-decorated colour-coated beaker	200-250 CE
22	CB104	BB1	Rim sherd of a plain-rimmed dish, decorated with widely-spaced arches	Late 2nd - early 3rd
	Cat. No. 3	G1	Rim of an everted, rounded-rim jar	Late 2nd c
	Cat. No. 4	G1	Rim of an everted, rounded-rim jar	Late 2nd c
	Gillam328	BBS	Rim of a BB like plain rim dish	160-200 CE
	Dr37	SAMIAN	Rim sherd of a decorated Samian bowl	70-mid 3rd CE
32	Cat. No. 5	G1	Rim sherd of a Dales type jar	3rd c.+
44	HS.BO86/7	BB1	Rim sherd of a BB1 plain-rimmed dish	Mid to late 2nd c.
	HS.BO31/3	BB2	Rim sherd of a BB2 bowl	CE 140+
	Cat. No. 6	G1	Rim sherd of a gritty coarse bowl/large storage jar	Early 2nd c.?
51	Gillam 316	BB1	Rim sherd of a BB1 dish	125-160 CE
59	Cat. No. 7	G0	Rim sherd of a calcite-gritted ware jar	4th c.
59	Cat. No. 8	G0	Rim sherd of a calcite-gritted ware jar	4th c.
	Tyers 20.1A	BB1	Rim sherd of a highly everted BB1 jar	Late 3rd-4th c.
	Castor box	F101	Rim sherd of a Nene Valley colour-coated castor box lid	4th c.
	Cat. No. 9	G1	Rim sherd of a gritty round-rimmed jar	4th c.
72	HS.BO29	R0	Rim sherd of a greyware bowl	Mid to late 2nd c.
73	Cat. No. 10	R0	Rim sherd of a greyware truncated conical bowl	Mid-3rd c.

Context No	Form type	Fabric	Description	Date
75	Gillam 227	BB1	Rim sherd of a BB1 bowl with decorating arches	Mid-3rd to mid-4th
86	Gillam 147	BB1	Rim sherd of a BB1 jar	290-370 CE
	Gillam 88	F101	Body sherd of a barbotine decorated Nene Valley colour-coated beaker	190-260 CE
89	Cat. No. 11	R1	Rim sherd of a reduced everted rim jar	Late 2nd c.
102	HS.JA63	BB1	Rim of a BB1 jar with obtuse lattice decoration	3rd c.
	HS.BO39B	BB2	Rim sherd of a BB2 bowl	160+ CE
	HS.JA55	BB2	Rim sherd of a BB2 jar	Mid-2nd to mid-3rd
119	Gillam 282	M1	Rim sherd of a hammerhead *mortarium*	End of 3rd -4th c.
	Gillam 145	BB1	Rim sherd of a BB1 jar	End of 3rd -4th c.
	Gillam 121	BB1	Rim sherd of a BB1 jar	End of 3rd -4th c.
	HS.BO40	BB2	Rim sherd of a BB2 bowl	160+ CE
	HS.BO85	BB1	Rim sherd of a BB1 dish	Early 3rd c.
	Cat. No. 12	R3	Rim sherd of a reduced mini jar	4th c.?
128	Dr18/31	SAMIAN	Rim of a Samian dish	Early 2nd c.
132	Gillam 138	BB1	Rim sherd of a BB1 jar	180+ CE
	Gillam 282	M1	Rim sherd of a hammerhead *mortarium*	290-370 CE
	Dr18/31	SAMIAN	Body sherd of a Samian dish	90-150 CE
	Webster FORM 68	SAMIAN	Flange of a Samian beaker	Mid-late 2nd c.
	Dr33a	SAMIAN	Body sherd of a Samian cup	Mid-late 2nd c.
	Curle21	SAMIAN	Body sherd of a Samian bowl/*mortarium*	2nd half of 2nd c.
133	Gillam 123	BB1	Rim sherd of a BB1 jar	125-160 CE
	Dr30	SAMIAN	Body sherd of a Samian bowl	2nd c.
	Gillam 122	BB1	Rim sherd of a BB1 jar	125-160 CE
	Gillam 135	BB1	Rim sherd of a BB1 jar	170-250 CE
141	Dr18	SAMIAN	Rim sherd of a Samian dish	Mid-late 1st c.
146	Cat. No. 13	R2	Rim sherd of a greyware jar	4th c.?
150	Gillam 142	BB1	Rim sherd of a BB1 jar	190-280 CE
165	Gillam 147	BB1	Rim sherd of a BB1 jar	290-370 CE
	Gillam 329	BB1	Rim sherd of a BB1 dish	190-340 CE

Context No	Form type	Fabric	Description	Date
169	Cat. No. 14	G1	Rim sherd of an gritty, oxidised dish	Late 2nd c.?
	Gillam 225	BB2	Rim sherd of a BB2 bowl	190-240 CE
188	Gillam1976.57	BB1	Rim sherd of a BB1 dish	Mid-2nd c.
	Gillam 86	F101	Rim sherd of a Nene Valley colour coated beaker	Late 2nd-early 3rd
	Cat. No. 15	O1	Rim sherd of a ring flagon	140-200 CE
	Gillam 138	BB1	Rim sherd of a BB1 jar	180-250 CE
207	HS.BO36	BB2	Rim sherd of a BB2 bowl	140+ CE
	Gillam 157	G1	Rim sherd of a Dales type jar	250-340 CE
210	Gillam132	BB1	Rim sherd of a BB1 jar	140-220 CE

APPENDIX 6: CREMATION RADIOCARBON DATING

All cremations and pyre-related deposits were subjected to radiocarbon dating. The table below gives additional details on these samples, including what type of sample was sent to be analysed by Beta Analytics. Samples from contexts M24-117, M24-84 (carbonised wood), and M24-171 incorrectly date to the late Mesolithic and Neolithic periods of Britain, while samples M24-156, M24-170, and M24-172 incorrectly date to the British Iron Age. These false dates are likely the result of the 'old wood effect', a phenomenon where the carbon exchange between the fuel and the combustible is affected by the age of the fuel. This effect is not yet completely understood, but current research suggests that bone apatite and endogenous collagen are notably affected by the age of the fuel used in burning (see Hüls *et al*. 2010; Olsen *et al*. 2011; Snoeck *et al.* 2014). As such, the charcoal samples with the incorrect dates are likely fuels originating from long dead trees, possibly sourced from within the nearby peat bog. Similarly, the bone samples with the erroneous dates were burnt with older fuels, such as peat or wood sourced from the nearby peat bog. The rest of the samples fit within the chronology suggested by the pottery assemblage and the stratigraphy of the site.

The table below shows the sample dates calibrated to the Gregorian calendar. The subsequent documents provide further information for four key samples, including the dates calibrated to years before present (BP), high probability density range method plots, and information on the calibration database used when calibrating these samples.

Context No.	Feature Type	Area	Sample Type	Date	Probability
M24-103	Cremation	*Vallum*	Charcoal	224 - 376 CE	95.40%
M24-105	Cremation	*Vallum*	Charcoal	271 - 351 CE	57.60%
M24-117	Cremation	*Vallum*	Charcoal	4615 - 4454 BCE	90.10%
M24-82	Ditch fill (pyre debris)	*Vallum*	Charcoal	124 - 250 CE	91.60%
M24-84	Pyre debris pit	*Vallum*	Charcoal	126 - 253 CE	84.40%
M24-84	Pyre debris pit	*Vallum*	Carbonised wood	3034 - 2907 BCE	85.40%
M24-96	Pyre debris pit	*Vallum*	Charcoal	118 - 244 CE	94.40%
M24-99	Cremation	*Vallum*	Charcoal	275 - 347 CE	47.90%
M24-149	Cremation	South Ditch	Charcoal	110 - 236 CE	90.30%
M24-156	Cremation	South Ditch	Charcoal	376 - 194 BCE	93.30%
M24-158	Cremation	South Ditch	Charcoal	116 - 239 CE	92.80%
M24-165	Pyre	South Ditch	Charcoal	234 - 381 CE	95.10%
M24-170	Cremation	South Ditch	Bone	231 - 96 BCE	56.10%
M24-171	Cremation	South Ditch	Bone	2498 - 2341 BCE	74.60%
M24-172	Cremation	South Ditch	Charcoal	200 - 48 BCE	89.40%
M24-157	Cremation	South Ditch	Charcoal	116-239 CE	92.80%

BetaCal 5.0

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables: d13C = -25.5 o/oo)

Laboratory number **Beta-701934**

Conventional radiocarbon age **1830 ± 30 BP**

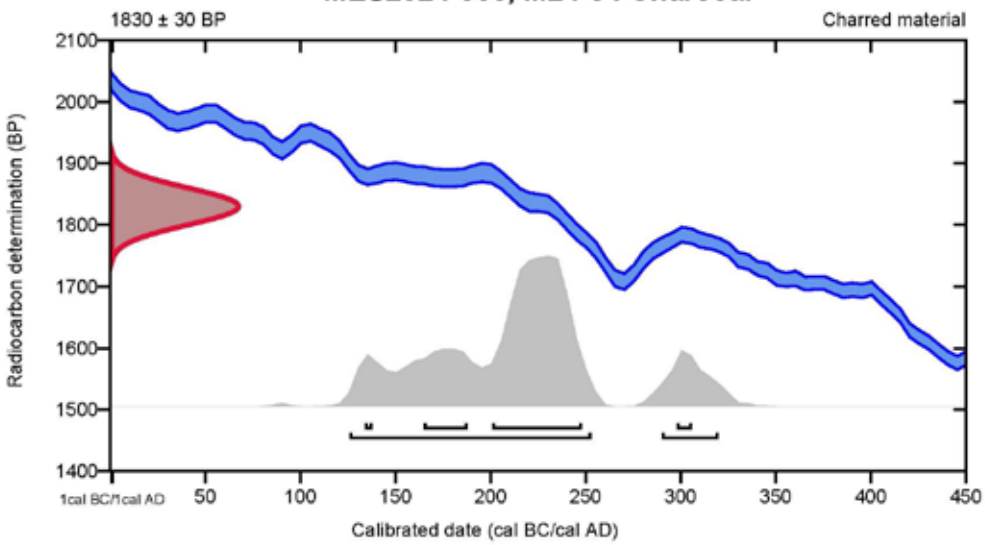
95.4% probability

(84.4%)	126 - 253 cal AD	(1824 - 1697 cal BP)
(11%)	290 - 320 cal AD	(1660 - 1630 cal BP)

68.2% probability

(50.6%)	201 - 248 cal AD	(1749 - 1702 cal BP)
(11.8%)	165 - 188 cal AD	(1785 - 1762 cal BP)
(3.9%)	298 - 306 cal AD	(1652 - 1644 cal BP)
(1.9%)	134 - 138 cal AD	(1816 - 1812 cal BP)

MES2024-035, M24-84 Charcoal



Database used

INTCAL20

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL20

Reimer, et al., 2020, Radiocarbon 62(4):725-757.

Beta Analytic Radiocarbon Dating Laboratory

4985 S.W. 74th Court, Miami, Florida 33155 • Tel: (305)667-5167 • Fax: (305)663-0964 • Email: info@betalabservices.com

BetaCal 5.0

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method (HPD): INTCAL20)

(Variables: d13C = -25.7 o/oo)

Laboratory number **Beta-701936**

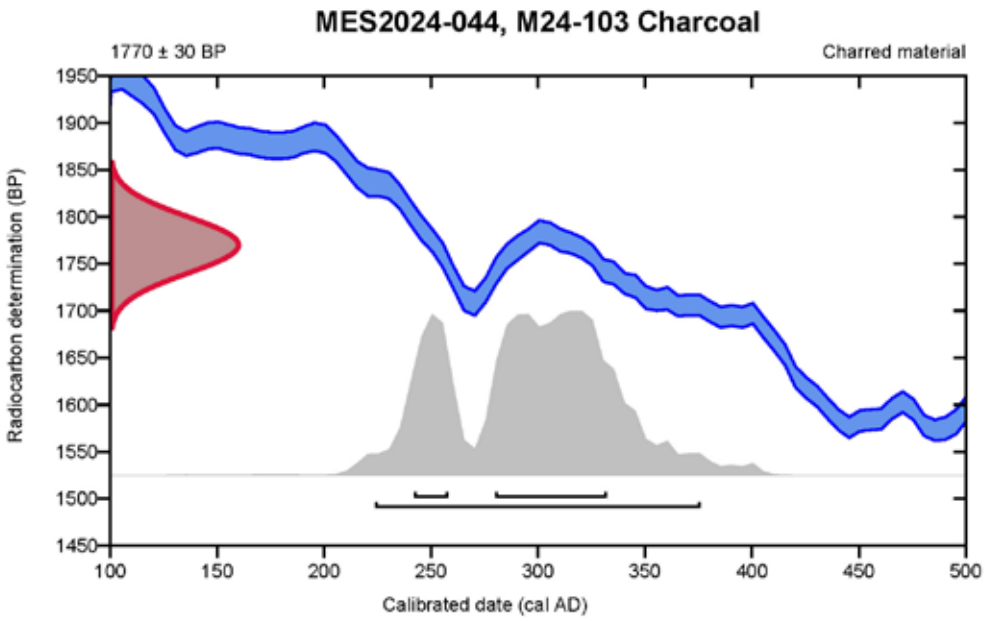
Conventional radiocarbon age **1770 ± 30 BP**

95.4% probability

(95.4%) 224 - 376 cal AD (1726 - 1574 cal BP)

68.2% probability

(52.5%) 280 - 332 cal AD (1670 - 1618 cal BP)
(15.7%) 242 - 258 cal AD (1708 - 1692 cal BP)



Database used

INTCAL20

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL20

Reimer, et al., 2020, Radiocarbon 62(4):725-757.

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ISO/IEC 17025:2017-Accredited Testing Laboratory

BetaCal 5.0

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method: INTCAL20)

(Variables: d13C = -26.0 o/oo)

Beta-Laboratory Number **712126**

Conventional Radiocarbon Age (BP) **1880 +/- 30 BP**

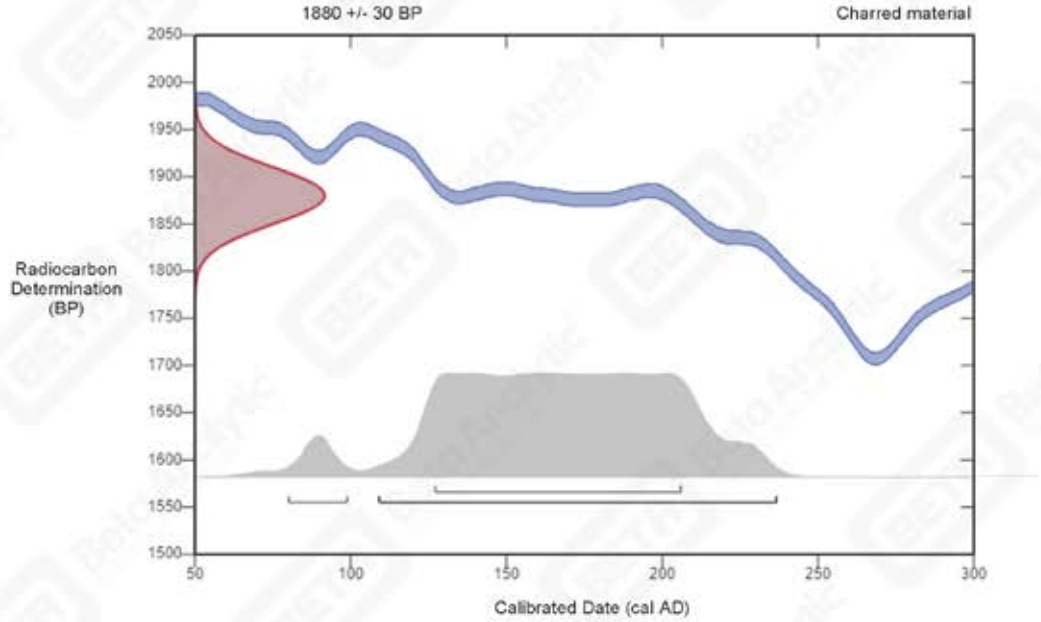
95.4% Probability Calibrated Range(s)

(90.3%)	110 - 236 cal AD	(1839 - 1713 cal BP)
(5.1%)	81 - 98 cal AD	(1868 - 1851 cal BP)

68.2% Probability Calibrated Range(s)

(68.2%)	128 - 205 cal AD	(1821 - 1744 cal BP)

MES2024-071, M24-149 Charcoal



Database Used

INTCAL20

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL20

Reimer, et al , 2020, Radiocarbon 62(4): 725-757.

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ISO/IEC 17025:2017-Accredited Testing Laboratory

BetaCal 5.0

Calibration of Radiocarbon Age to Calendar Years

(High Probability Density Range Method: INTCAL20)

(Variables: d13C = -27.5 o/oo)

Beta-Laboratory Number **708684**

Conventional Radiocarbon Age (BP) **1760 +/- 30 BP**

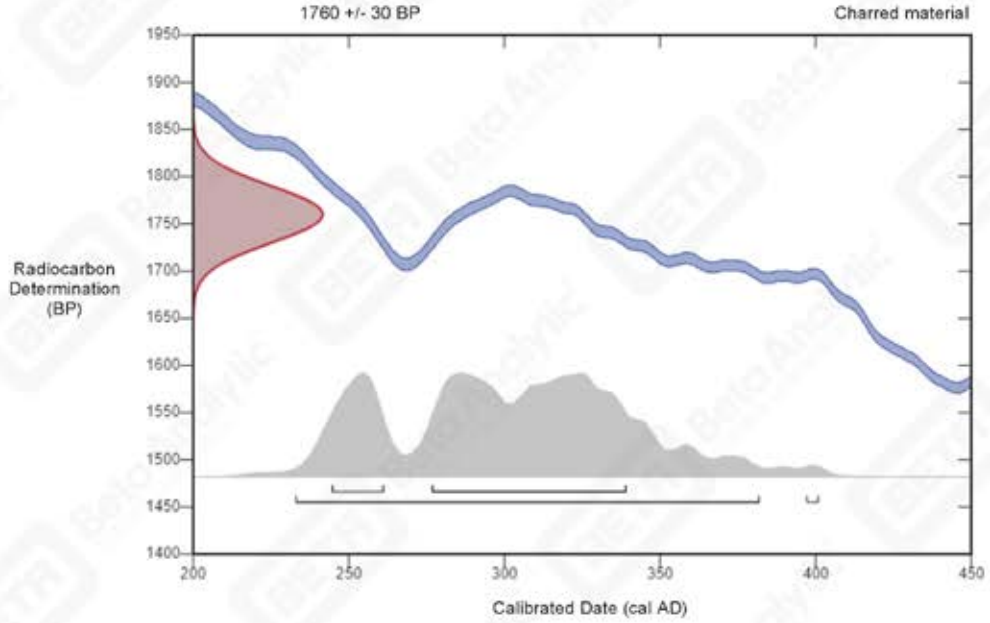
95.4% Probability Calibrated Range(s)

(95.1%)	234 - 381 cal AD	(1715 - 1568 cal BP)
(0.3%)	398 - 400 cal AD	(1551 - 1549 cal BP)

68.2% Probability Calibrated Range(s)

(55.0%)	278 - 338 cal AD	(1671 - 1611 cal BP)
(13.2%)	246 - 260 cal AD	(1703 - 1689 cal BP)

MES2024-079, M24-165 Charcoal



Database Used

INTCAL20

References

References to Probability Method

Bronk Ramsey, C. (2009). Bayesian analysis of radiocarbon dates. Radiocarbon, 51(1), 337-360.

References to Database INTCAL20

Reimer, et al., 2020, Radiocarbon 62(4): 725-757.

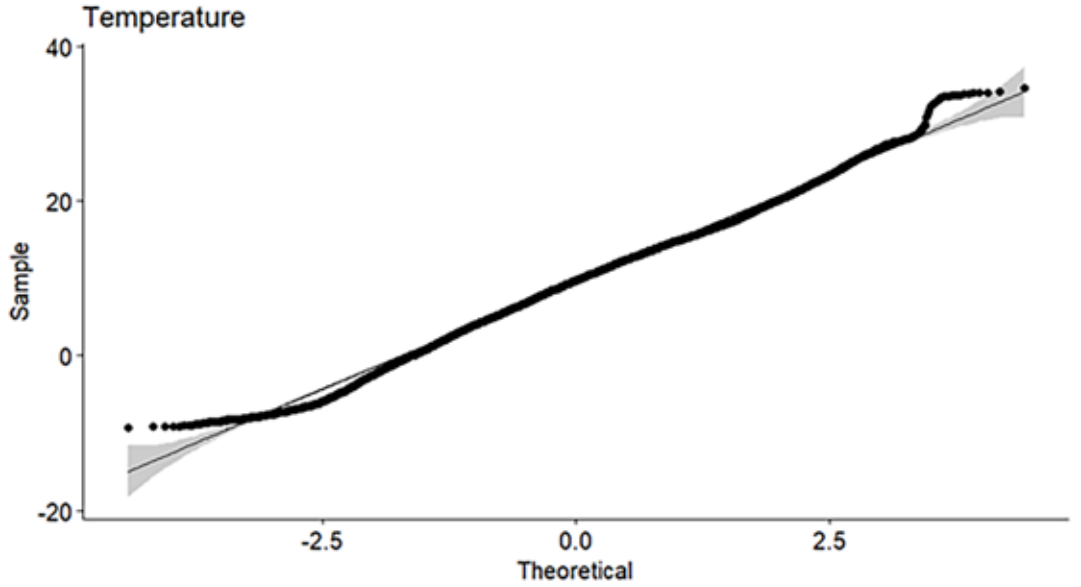
APPENDIX 7: ENVIRONMENTAL SAMPLES

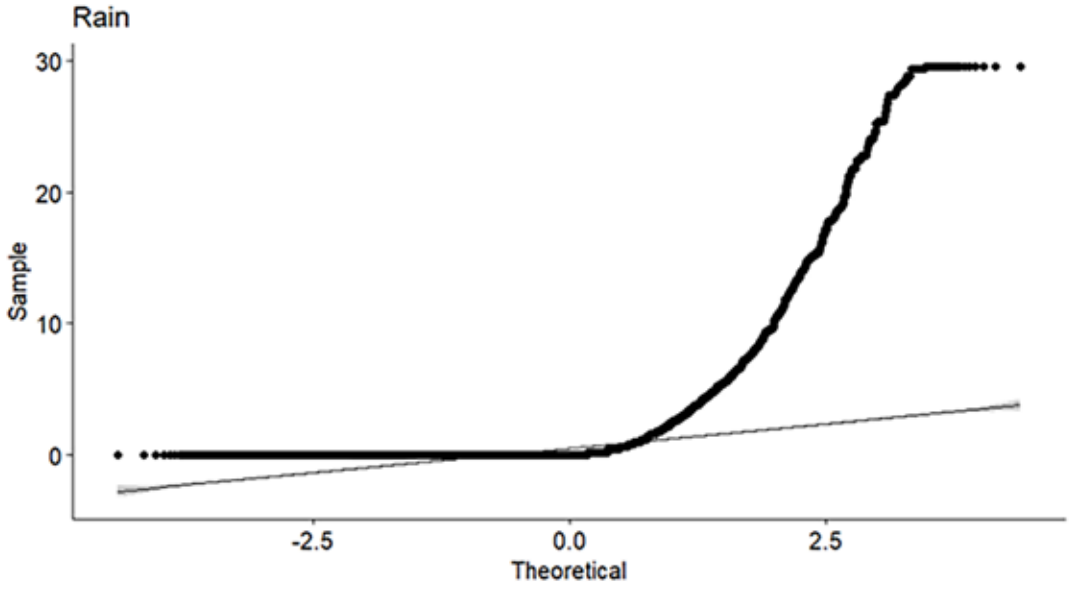
Sample No.	Context No.	Feature No.	Context Type	Sample Volume (L)
MES2024-001	M24-8	[7]	Fill of pit	20
MES2024-002	M24-12	[11]	Uppermost fill of Roman drain	40
MES2024-003	M24-10	[9]	Primary fill of pit	40
MES2024-004	M24-14	[13]	Uppermost fill of ditch	20
MES2024-005	M24-18	[17]	Primary fill of pit	20
MES2024-006	M24-21	[9]	Secondary fill of pit	20
MES2024-007	M24-3	[2]	Upper fill of ditch	5
MES2024-008	M24-25	[24]	Fill of shallow post hole	2.5
MES2024-009	M24-23	[2]	Primary fill of ditch	40
MES2024-010	M24-29	[28]	Fill of small post hole	5
MES2024-011	M24-32	[36]	Fill of gully	7.5
MES2024-012	M24-34	[33]	Fill of post hole	20
MES2024-013	M24-35	[11]	Primary fill of Roman stone drain	30
MES2024-014	M24-41	[40]	Fill of shallow gully	5
MES2024-015	M24-27	[26]	Fill of ditch	17.5
MES2024-016	M24-27	[26]	Fill of ditch	35
MES2024-017	M24-48	[47]	Uppermost fill of well	40
MES2024-018	M24-46	[45]	Uppermost fill of ditch	10
MES2024-019	M24-51	[45]	Primary fill of urine ditch	10
MES2024-020	M24-49	[47]	Tertiary fill of well	20
MES2024-021	M24-50	[47]	Secondary fill of well	20
MES2024-022	M24-35	[11]	Primary fill of Roman stone drain	10
MES2024-023	M24-12 IN DRAIN	[11]	Fill of Roman stone drain	10
MES2024-024	M24-54	[43]	Siltation in ditch	10
MES2024-025	M24-53	[47]	Primary fill of well in *vallum* trench	10
MES2024-026	M24-63	[62]	Fill of pit	5
MES2024-027	M24-65	[64]	Fill of pit	10
MES2024-028	M24-59	[58]	Secondary fill of ditch	20
MES2024-029	M24-67	[66]	Waterlogged soil deposit in pit	2.5
MES2024-030	M24-75	[74]	Fill of gully	20
MES2024-031	M24-77	[76]	Fill of gully	10
MES2024-032	M24-79	[78]	Fill of gully	5
MES2024-033	M24-82	[80]	Burnt deposit	40
MES2024-034	M24-71	[155] *Vallum*	Uppermost fill of *vallum*	15
MES2024-035	M24-84 MIXED	[83]	Cremation pit	55

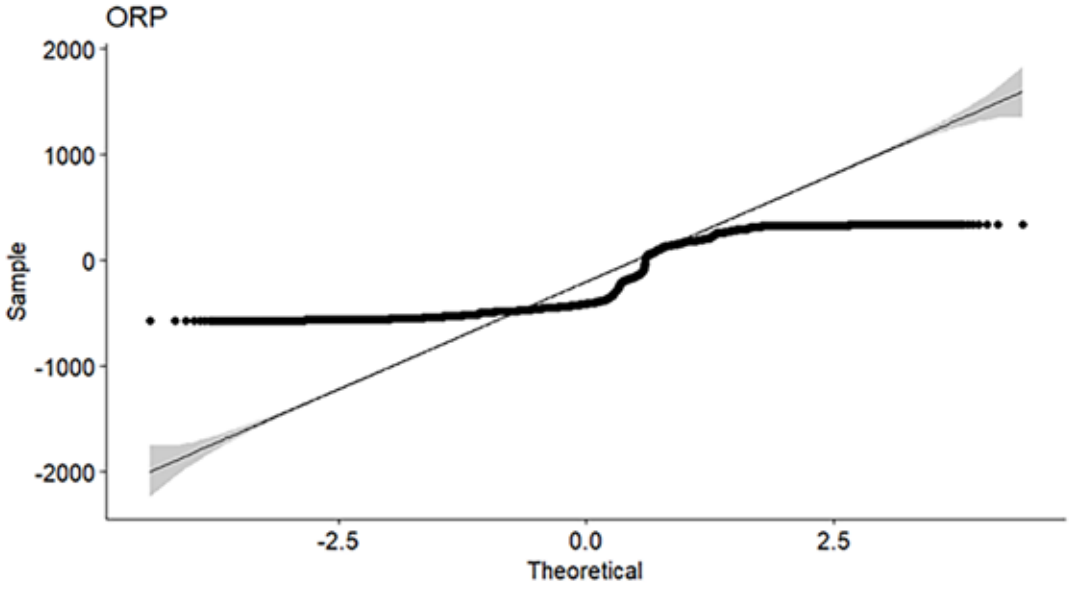
Sample No.	Context No.	Feature No.	Context Type	Sample Volume (L)
MES2024-036	M24-86	[85]	Fill of ditch	20
MES2024-037	M24-72	[58]	Primary fill of ditch	20
MES2024-038	M24-90	[155] *Vallum*	Fill of *vallum*	10
MES2024-039	M24-92	[91]	Primary fill of pit	7.5
MES2024-040	M24-81	[80]	Fill of gully leading into *vallum*	5
MES2024-041	M24-96	[83]	Upper fill of cremation pit	35
MES2024-042	M24-100	Lens	Potentially degraded turf below northern *vallum* mound	5
MES2024-043	M24-99	[98]	Cremation	30
MES2024-044	M24-103	Cremation	Cremation	15
MES2024-045	M24-105	Cremation	Cremation	10
MES2024-046	M24-104	Charcoal deposit	Charcoal deposit near cremation cluster	5
MES2024-047	M24-104	Charcoal deposit	Charcoal deposit near cremation cluster	1
MES2024-048	M24-105	Cremation	Cremation	1
MES2024-049	M24-106	Charcoal deposit	Charcoal deposit near cremation cluster	10
MES2024-050	M24-107	Charcoal deposit	Charcoal deposit near cremation cluster	5
MES2024-051	M24-112	[101]	Siltation in possible Roman drainage ditch	10
MES2024-052	M24-110	[109]	Burnt deposit	50
MES2024-053	M24-117	Cremation	Cremation	5
MES2024-054	M24-116	Cremation	Charcoal deposit near cremation cluster	1
MES2024-055	M24-102	[101]	Upper fill of ditch	5
MES2024-056	M24-84 WEST	[83] Cremation	Cremation pit	25
MES2024-057	M24-96	[83] Cremation	Upper fill of cremation pit	35
MES2024-058	M24-96	[83] Cremation	Upper fill of cremation pit	10
MES2024-059	M24-84 EAST	[83] Cremation	Cremation pit	195
MES2024-060	M24-003	[2]	Upper fill of ditch	5
MES2024-061	M24-003	[2]	Upper fill of ditch	5
MES2024-062	M24-121	[120]	Uppermost fill of ditch	5
MES2024-063	M24-123	[124]	Degraded turf deposit in southern *vallum* mound	5
MES2024-064	M24-131	{125}	Siltation within modern stone drain	1
MES2024-065	M24-128	[127]	Uppermost fill of ditch	5
MES2024-066	M24-133	[127]	Secondary fill of ditch	5
MES2024-067	M24-133	[127]	Secondary fill of ditch	5
MES2024-068	M24-135	[134]	Fill of ditch	5
MES2024-069	M24-137	[136]	Fill of ditch	5
MES2024-070	M24-148	[147]	Fill of potential beam slot	5
MES2024-071	M24-149	[150] Cremation	Cremation	28
MES2024-072	M24-156	Cremation	Cremation	5

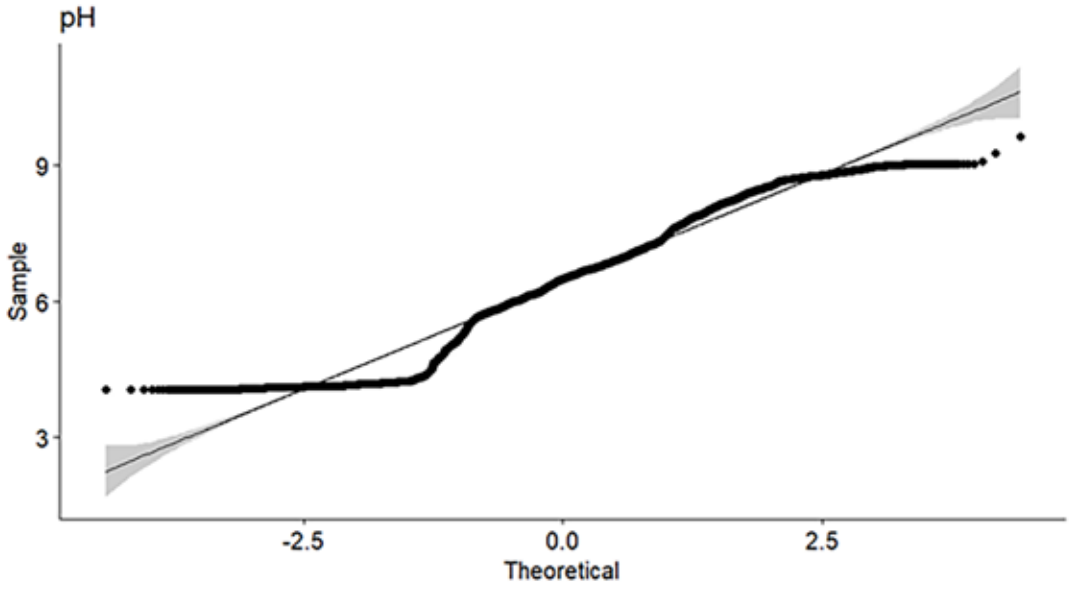
Sample No.	Context No.	Feature No.	Context Type	Sample Volume (L)
MES2024-073	M24-157	Cremation	Cremation	1
MES2024-074	M24-158	Cremation	Cremation	2
MES2024-075	M24-146	[150]	Natural siltation around pyre	10
MES2024-076	M24-144	Charcoal deposit	Upper deposit within pyre ditch	5
MES2024-077	M24-161	Charcoal deposit	Charcoal deposit near cremation cluster	0.5
MES2024-078	M24-162	Charcoal deposit	Charcoal deposit near cremation cluster	0.5
MES2024-079	M24-165	[150] Pyre	Pyre mound	45
MES2024-080	M24-170	Cremation	Cremation	5
MES2024-081	M24-171	Cremation	Cremation	5
MES2024-082	M24-172	Cremation	Cremation	5
MES2024-083	M24-165	[150] Pyre	Pyre mound	15
MES2024-084	M24-201	[155] *Vallum*	Lower fill in *vallum*	5
MES2024-085	M24-189	[155] *Vallum*	Lower-middle fill of *vallum*	10
MES2024-086	M24-190	[155] *Vallum*	Lower-middle fill of *vallum*	5
MES2024-087	M24-202	Dung deposit	Fill of pit	5
MES2024-088	M24-203	Dung deposit	Fill of pit	5
MES2024-089	M24-203	Dung deposit	Fill of pit	1
MES2024-090	M24-214	Well mound	Peat deposit under well mound	1
MES2024-091	M24-209	[208]	Fill of ditch	5
MES2024-092	M24-210	[208]	Fill of ditch	5
MES2024-093	M24-215	Peat deposit	Peat deposit in well trench	5
MES2024-094	M24-215	Peat deposit	Peat deposit in well trench	5
				1,395.5

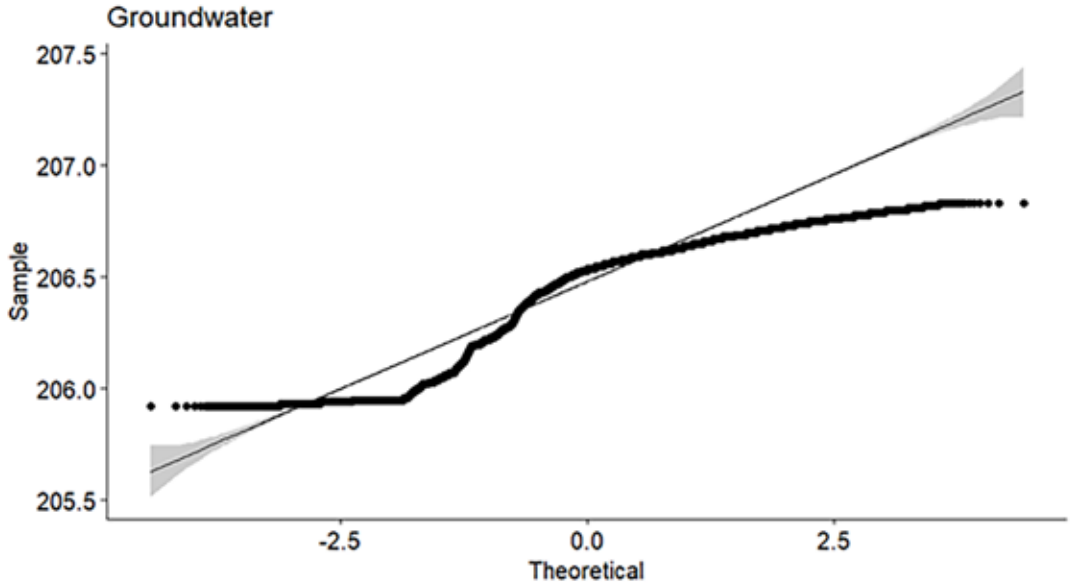
APPENDIX 8: DISTRIBUTION PLOTS








pH
Sample
9
6
3
-2.5
0.0
2.5
Theoretical


Groundwater
Sample
207.5
207.0
206.5
206.0
205.5
-2.5
0.0
2.5
Theoretical

APPENDIX 9: REPORT ON WOOD SAMPLES FROM MAGNA

DR ROB SANDS

Wood identifications of six samples:

- MW-2024-001 - *Betula sp.*
- MW-2024-002 - *Alnus sp.*
- MW-2024-003 - *Betula sp.*
- MW-2024-004 - cf. *Alnus sp./Betula sp.*
- MW-2024-7 - *Quercus sp.*
- M23-088 - *Quercus sp.*

All samples were preserved in damp anaerobic conditions. All samples are soft, and some were difficult to section. Identifications were undertaken using standard identification keys and online resources (e.g. Schweingruber 1982; Hather 2000; InsideWood 2004-onwards).

Samples have spores and some root fragments present.

MW-2024-001

Birch - *Betula sp.*

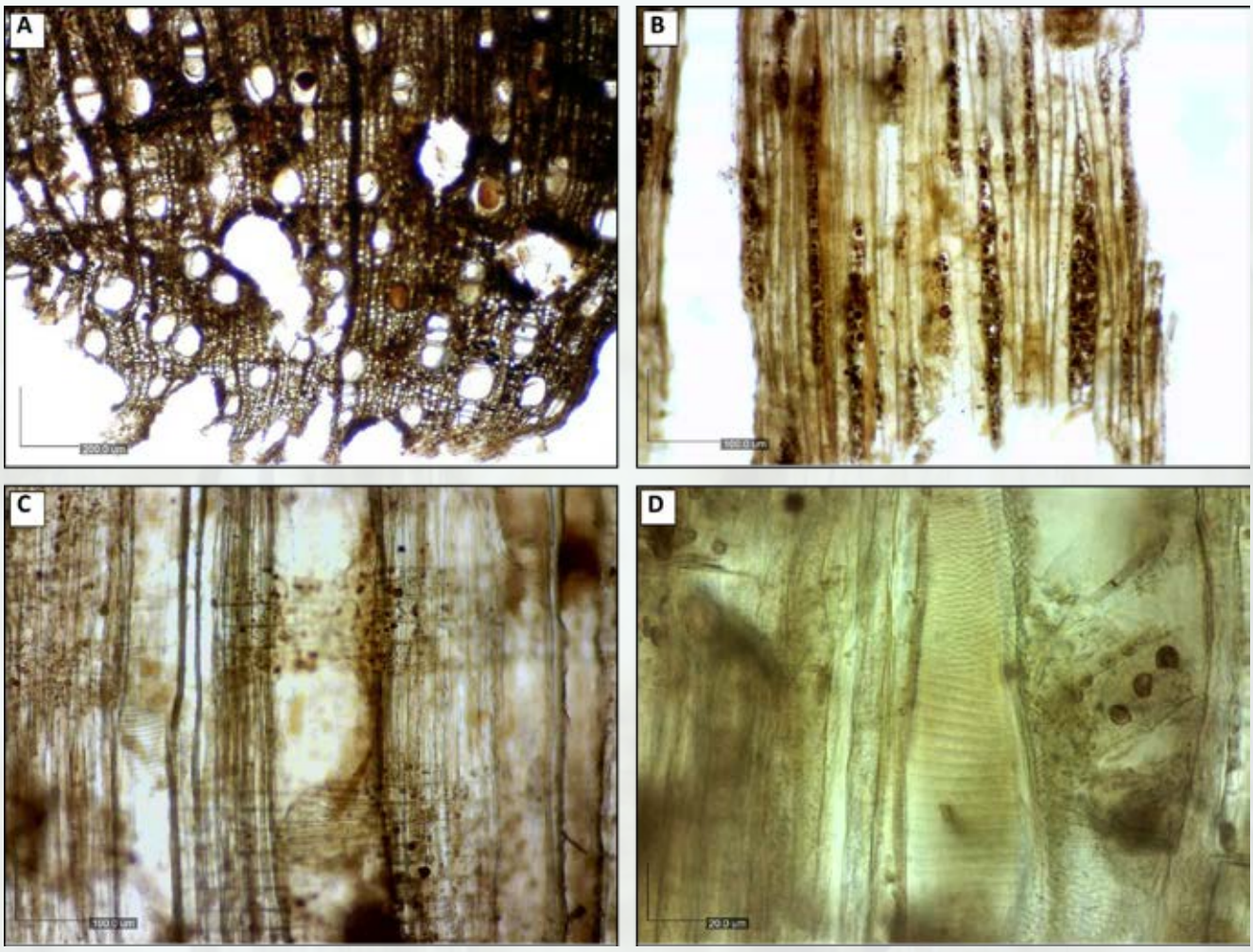
TS: Diffuse porous, vessels in radial files (2-3) (A

TLS: Uniseriate and multiseriate (1-2-3-4) (B)

RLS: Scalariform perforation plates – 10 – 15 bars, numerous small pits (C & D)

Piece in two parts – part 1 identified

1. 4.9x3.2x2.2cm
2. Small fragment



MW-2024-002

Alder – *Alnus sp.*

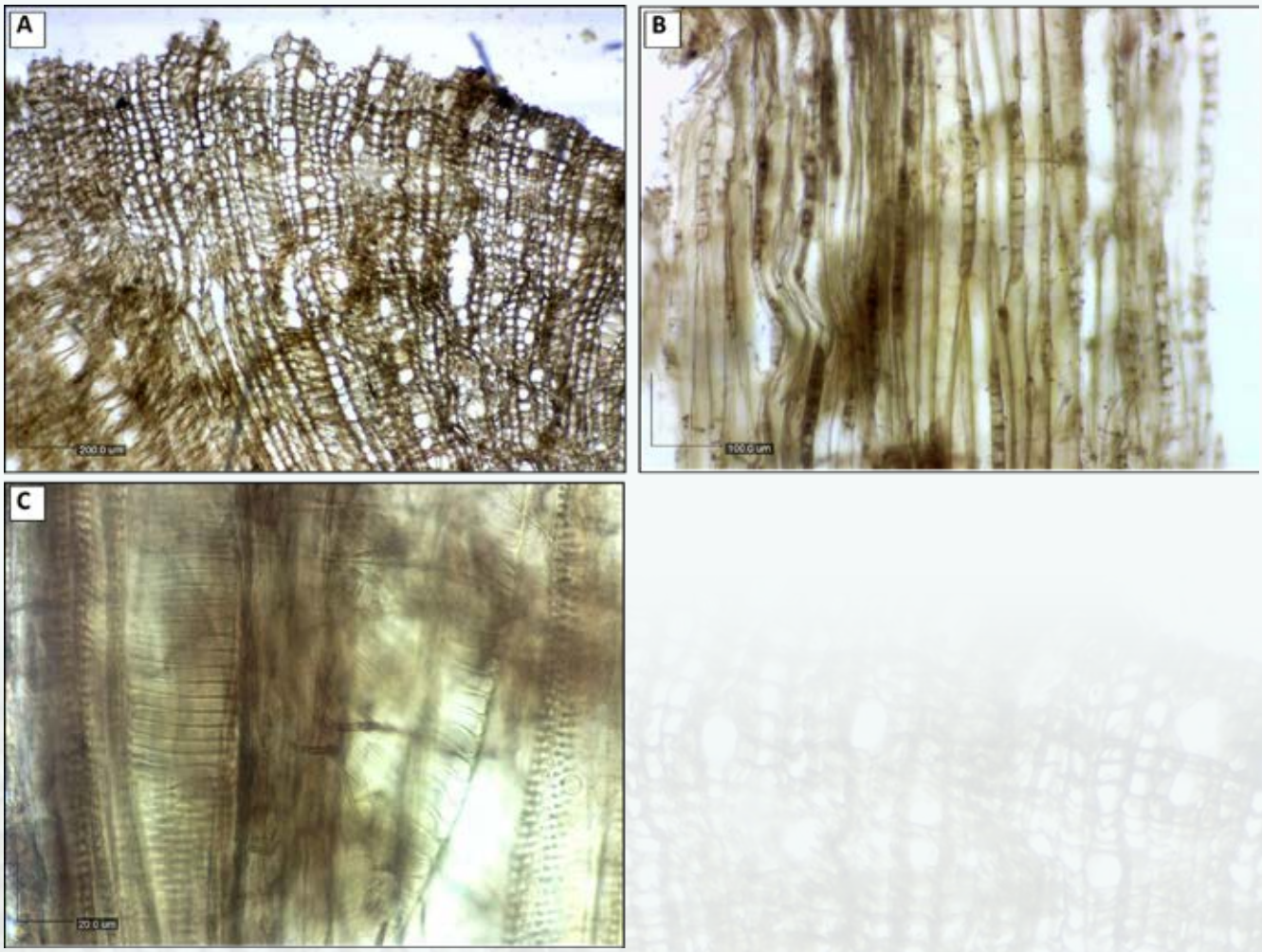
TS: Diffuse porous, vessels in radial files (2-3) (A)

TLS: Uniseriate (B)

RLS: Scalariform perforation plates – 10 – 20+ bars (C)

Twig

1. 2.3x0.6cm



MW-2024-003

Birch – *Betula sp.*

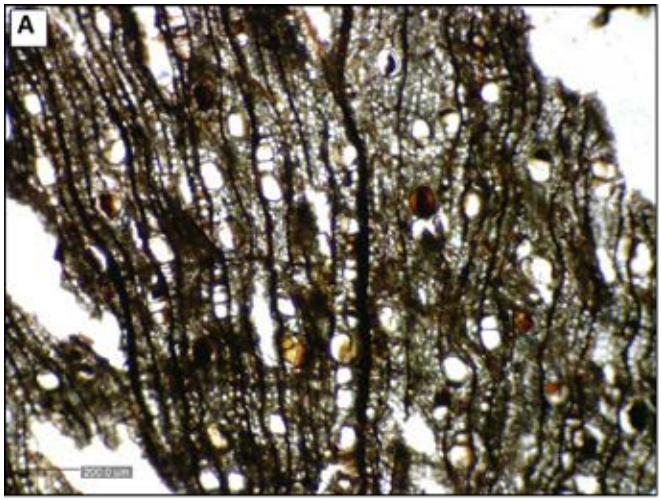
TS: Diffuse porous, vessels in radial files (2-3) (A)

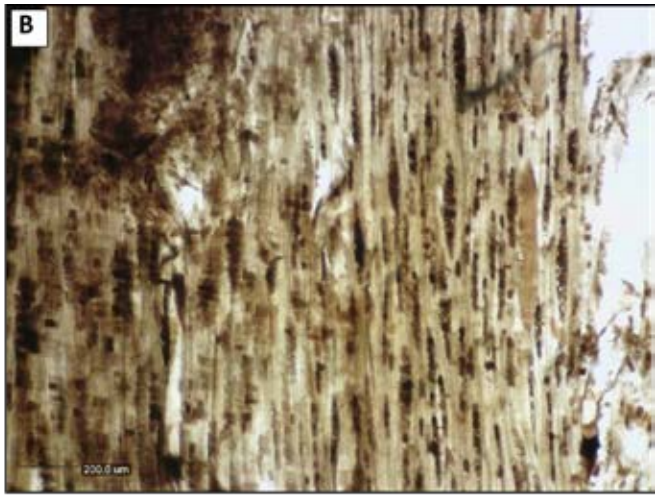
TLS: Uniseriate & multiseriate (1-2-3-4) (B)

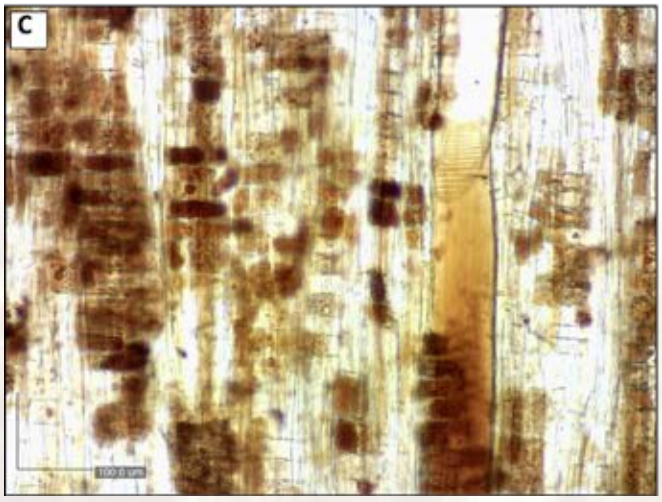
RLS: Scalariform perforation plates – 10 – 15 bars, small numerous pits (C) Sample now in two parts – part 1 identified

1. 4.0x2.5x1.6cm

2. 3.0x1.7x0.7cm







MW-2024-004

Alder (?)/Birch (?) – cf. *Betula sp./Alnus sp.*

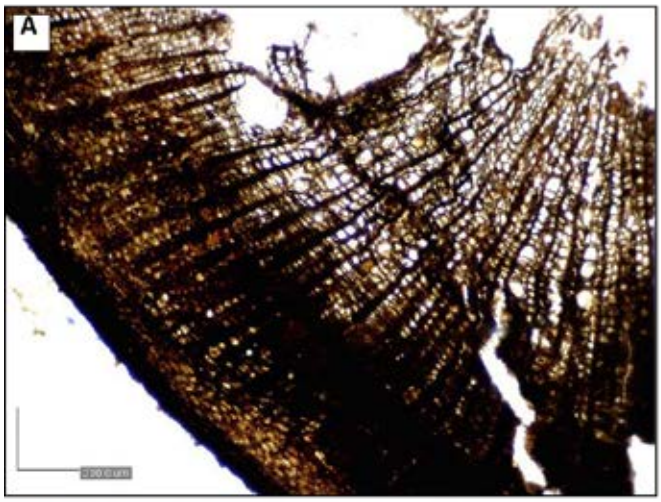
TS: Diffuse porous, young twig, bark present (A)

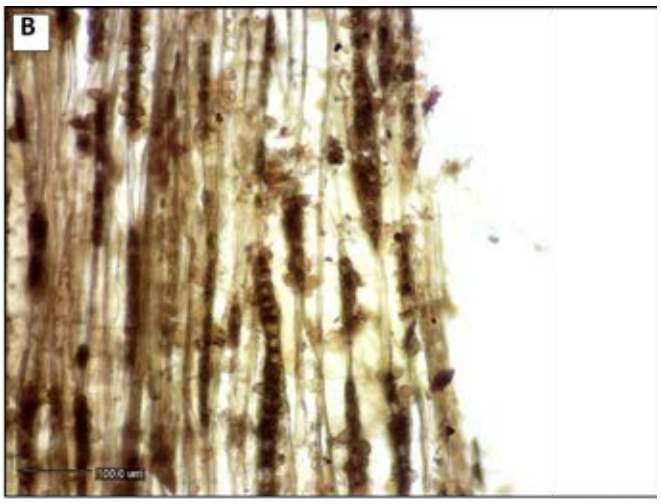
TLS: Uniseriate & biseriate (B)

RLS: Scalariform perforation plates – 10 – 20+ bars (C)

Note that in wood this young some characteristics are unreliable e.g. ray width. Perforation plates and pitting tend to be consistent. Overall, just leaning toward alder

One small twig. (4.0 x 0.8cm) - bark is holding the shape but has radially split internally so likely to have dried partially at some point.





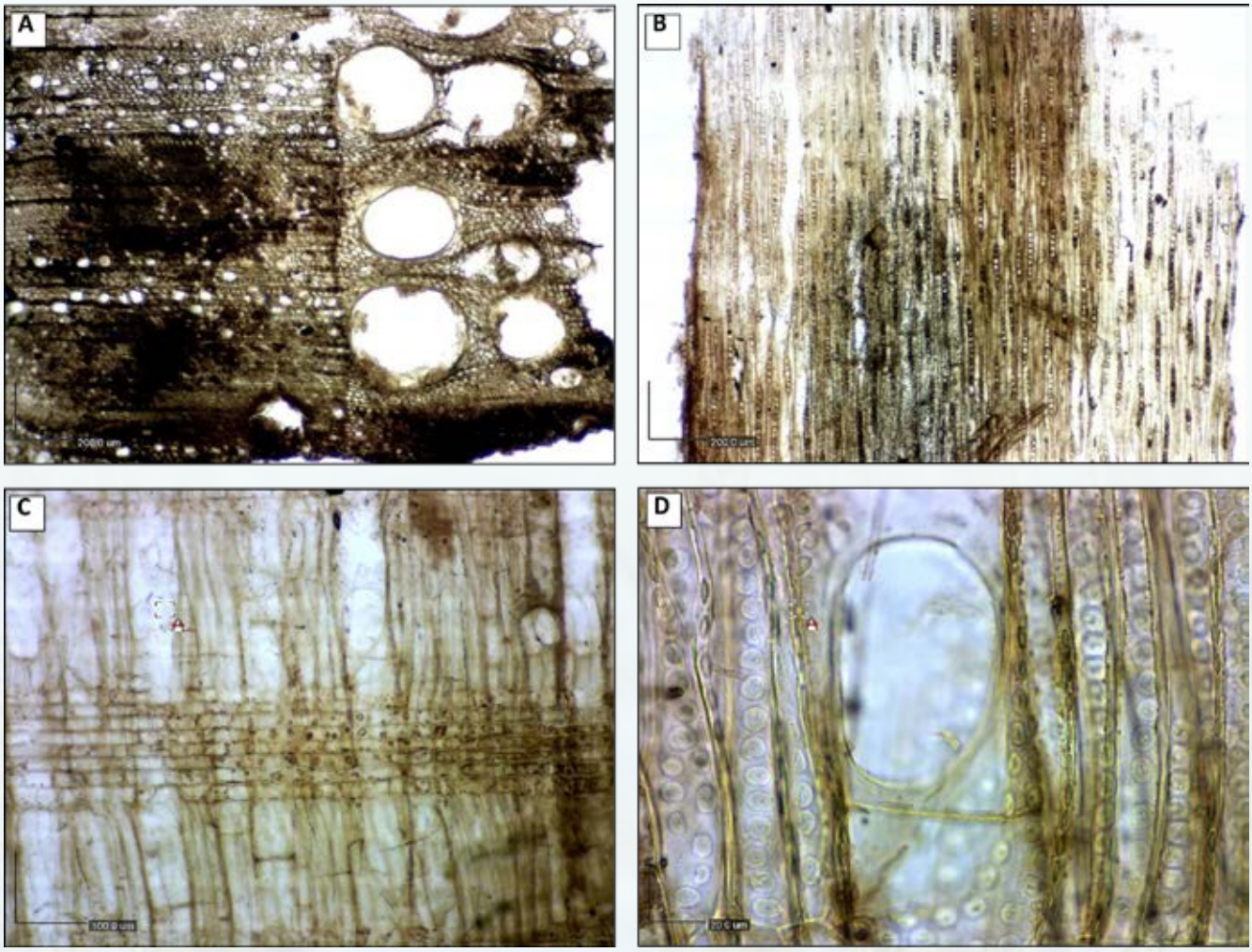
MW-2024-7

Oak – *Quercus sp.*

TS: Ring porous, wider rings than M23-088. Latewood flame like groups (A)

TLS: Uniseriate (B)

RLS: Simple perforation plates (C & D) Thin fragment of wood c. 12x1.7cm



M23-088

Oak – *Quercus sp.*

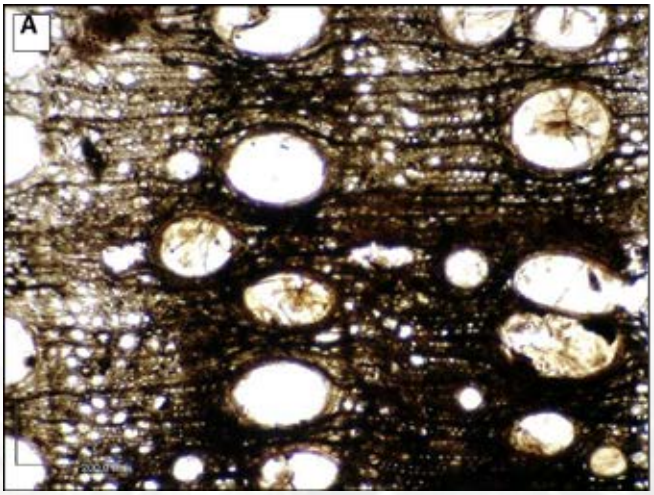
TS: Ring porous, tyloses present (mature heartwood), very tight rings. Latewood flame like groups (A)

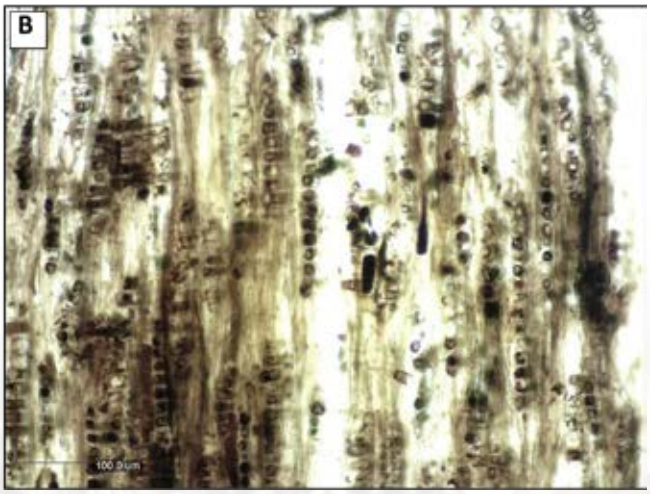
TLS: Uniseriate (B)

RLS: Simple perforation plates

Three wood fragments. All part of the same piece – part 1 identified

1. 6.2x2.9x0.8cm
2. 4.0x2.0x0.15cm
3. 5.0x3.5x0.15cm





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