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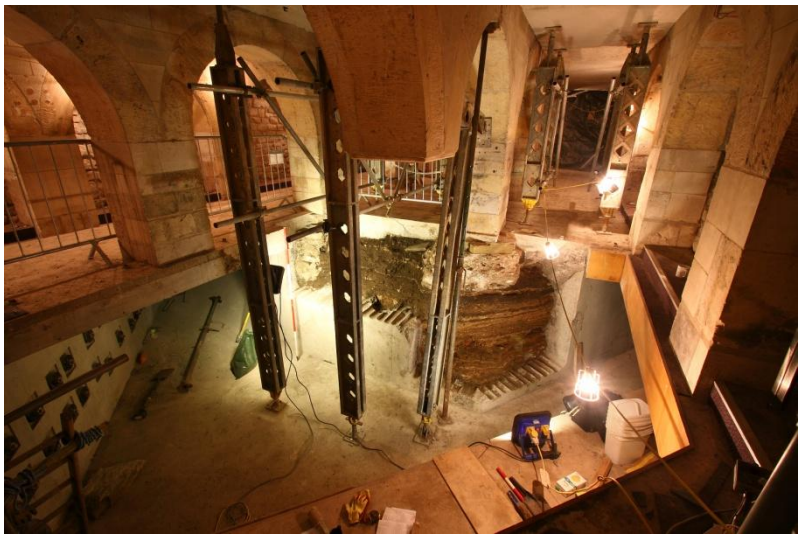

# YORK MINSTER REVEALED,

# UNDERCROFT TREASURY

## EXCAVATION REPORT

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# YORK ARCHAEOLOGICAL TRUST

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## Abbreviations

AOD Above Ordnance Datum

## 1. SUMMARY

The *York Minster Revealed* excavation in the cathedral Treasury encountered significant archaeological remains from the Roman period to the 15th century. These were analysed together with the results of excavation in 1972, to produce the following observations:

- Two cobbled surfaces of the Via Quintana, the Roman road between the *basilica* and the *praetorium*, were identified. The earliest is undated but may represent the 2nd century surface, repaired at an unknown date and subsequently sealed beneath a 4th century re-surfacing.
- The sequence of road surfaces may relate to phases of alteration to the nearby *basilica* rear wall, and in particular to a large doorway indentified in 1972 and interpreted as 4th century in date. One of the buildings in the area had a stone roof, part of which was used to cover over and level up the road cobbles.
- The area of the doorway was modified late in the Roman period, with a probable paved surface identified in 2012, which relates to a monumental porch setting observed in 1972.
- In the post-Roman period, a sequence of probable paved surfaces developed over the former road. These may represent structures that incorporated the Roman walls in the Anglian period.
- A crude 'road' then developed that may relate to the Anglo-Scandinavian cemetery known to have existed within the footprint of the former *basilica* by the 10th century. This may imply the survival of the *basilica* walls as the cemetery boundary and the former doorway as an access.
- The area was cleared in advance of constructing the Norman cathedral of 1080. At this date, there were still structures containing significant quantities of Roman building material present.
- The construction of the 15th century east end by c.1420 is apparent, and truncates the earlier Norman deposits.
- The foundations for the post-1837 fire crypt arcade were exposed.

## 2. INTRODUCTION

An excavation in the treasury of York Minster was undertaken between 27th November and 13th December 2012, with further observation and recording thereafter until 1st February 2013 (Figures 1 and 2). The work was necessitated by construction works associated with *York Minster Revealed*, a major HLF funded programme of improvements to visitor access and experience at York Minster, which includes the complete refurbishment of the Undercroft. The treasury forms the eastern wing of the Undercroft, where the installation of new stairs and a platform wheelchair lift required the cutting back of structural concrete dating from the emergency engineering works of 1967-1972. This exposed a block of significant *in situ* archaeological deposits that had to be excavated. Additionally, the design of the new lift required the partial dismantling and subsequent re-recording of a major Roman wall first exposed in 1970. Following this procedure, all the surviving Roman structures in the Undercroft were re-recorded.

## 3. METHODOLOGY

The excavated area was located in the 6m x 3m, 2m deep concrete lined well of the treasury (Figures 2 and 8). This well contains the remains of the NE wall of the basilica of the Roman *principia*, which was formerly viewed from a mezzanine landing accessed from the west by steps from the central chamber of the Undercroft. These steps and the landing were demolished, and the reinforced concrete eastern wall of the well was cut away using diamond-tipped drills and stone splitting equipment. This exposed a west-facing section of *in situ* deposits that were last observed in 1970 and which had to be cut back by 0.80m. The deposits in this block were hand-excavated archaeologically, including a pair of 19th century mortared pier foundations which projected from the section and were removed using a powered hand drill. These foundations supported two piers of the crypt, which were immediately propped by the main contractor, Wm Anelays, under the supervision of the Surveyor of Fabric, Andrew Arroll, and subjected to regular monitoring during the excavation. Standard YAT recording and sampling practises were observed throughout the excavation.

During the course of the excavation it became apparent that the footprint of the new lift would require the removal of a single block of stone from the Roman basilica wall (Figure XX). After consultation with the Cathedral Archaeologist, Stuart Harrison and the Inspector of Ancient Monuments for English Heritage, Keith Emerick, this work was approved and carried out under the observation of the author on December 20th 2012. Following this operation, it was decided to fully record the surviving basilica wall in plan and elevation, and then to record every remaining Roman structure in the Undercroft to provide a record of their current

condition and to augment the records made during the original excavations that exposed them. This was conducted after the Treasury excavation, between 3rd January and 1st February 2013.

## 4. LOCATION, GEOLOGY AND TOPOGRAPHY

York Minster is located in the northern quadrant of the historic walled city (Figure X). The geology of the area consists of drift deposits of Devensian glacial till overlying bedrock of the Sherwood Sandstone group (http://mapapps.bgs.ac.uk/geologyofbritain/home.html, accessed 11/02/2013). The topography of the wider area is generally flat, sloping down gradually to the River Ouse to the south and south-west, but the excavated area was effectively divorced from this landscape by being located inside a large building with a complex structural history that has substantially altered the topographical context. The deposits and features are therefore best understood within a re-constructed landscape derived from the extensive previous archaeological investigations at York Minster, summarised below.

## 5. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

### 5.1 YORK MINSTER EXCAVATIONS 1967-1972

The history and archaeology of York Minster, from the documentary records of a church in c.627 to the Gothic structure completed c.1450, have been extensively published in many readily available sources and only the briefest summary is offered here.

The cathedral occupies the site of the legionary headquarters of Roman *Eboracum*, the remains of which were discovered during extensive excavations undertaken between 1967 and 1973, initially by Royal Commission archaeologists Brian Hope-Taylor and Herman Ramm, and then by Derek Phillips under the Archaeological Advisory Committee (Phillips, 1985, 28-46). These excavations created the Undercroft, and were conducted during an emergency engineering programme, necessitated by the rapid deterioration of the tower fabric due to the accelerating failure of the foundations (Phillips, 1995, 16-22). The requirements of a huge under-pinning operation required the excavation of most of the crossing and much of the eastern arm in a series of non-consecutive trenches that were, in the main, excavated rapidly by labourers under the barest of archaeological supervision (Figure 2).

Commencing with the extensive Roman structures and deposits, a long and nationally important sequence was revealed. Tantalising evidence for the immediate post-Roman fate of the *basilica* building of the *principia* was published along with the Roman phases in *Excavations at York Minster: Volume 1* (1995). Also included in this volume was an Anglo-Scandinavian cemetery that overlay the collapsed remains of the *principia* and extensive deposits of 'dark earth'. This cemetery was focussed in the area of the *basilica* and was held to be a development of an earlier, Anglian, graveyard that has huge potential significance for the early history of the Minster. Cut through this, and published in *Excavations at York Minster: Volume 2* (1985), were the foundations of the Norman cathedral of Archbishop Thomas of Bayeux of 1080. Extensively modified in the 12th century under Archbishop Roger Pont L'Evêque (Stuart Harrison, pers. comm.), this structure was then replaced in the Gothic style between c.1225 and c.1450, producing the current cathedral comprehensively analysed by Sarah Brown in *York Minster, An Architectural History c 1220-1500* (2003).

## 5.2 THE TREASURY SEQUENCE RECORDED IN 1970

The soil section exposed by the current works was recorded at 1:12 as 'WCA 1' on 28-29th July 1970 by Derek Phillips (Figure 4, Plates 1 and 2). Comparison with the modern drawing (Figure 5, Plate 3 and 4) will immediately demonstrate the close correlation between the two records, which is to be expected as WCA1 was only 1m to the west of the 2012 excavation, although their observation was separated by 42 years. The rationale for a full excavation during the current works lay in the extremely rapid nature of the original excavation. This part of the treasury was excavated and recorded as area 'WC' ('Western Crypt') in 1970, during the later phases of the emergency engineering programme. By this time, the stability of the Minster was assured, and the relationship between the archaeologists and the contractors had developed to allow for more detailed archaeological excavation and recording than was possible earlier (Phillips, 1995, 22-24). Area WC is thus one of the few to have been issued with context numbers that are identifiable in the stratigraphic and artefactual archive. However, many of the 'contexts' described in the archive are in fact groups of similar or spatially related deposits that a modern analysis would regard as a 'set' of related deposits at best, or even as a 'group' of related sets. Additionally, the archive notes revealed that even in this relatively 'controlled' area, only a few of the deposits were hand-excavated by archaeologists, specifically the Roman road surfaces and the early phases of possibly post-Roman levelling that sealed them. The majority of the sequence described below was dug away by workmen with only soil section recording possible (Graeme Guilbert's site notebook, archive). Any opportunity to refine the stratigraphic detail and recover artefactual and environmental data was therefore of great potential value.

The treasury sequence recorded in 1970 commences with features and deposits interpreted as traces of the initial timber fortress buildings of the late 1st century AD, and the foundations of the buildings that represent an early 2nd century re-build of the fortress in stone. The principle structure identified in area WC was a 10m stretch of the NE wall of the basilica, most of which was interpreted as part of a comprehensive 4th century reconstruction of the 2nd century stone structure. This phase was identified chiefly from the apparent re-setting of the basilica colonnades, seen elsewhere, which was interpreted to demonstrate that 'the *basilica* uncovered in the excavations [was] a 4th century, not … a late 1st/early 2nd century building" (Phillips, 1995, 41). In area WC this phase was represented by the upper three courses of the basilica wall, recorded as WC 16. These were set back from the original wall face, forming a relatively narrow wall that was nevertheless still a substantial structure (Figures 6 and 9, Plates 13, 14, 25-29).

Abutting this wall and associated with the 4th century *principia* alterations was an apparently unnumbered road surface, sealed by a substantial layer of clay and overlain by a sequence of four metalled road surfaces, WC 42, WC 39a/b, WC 34 and WC 19, and a final layer of 'unmortared flagging', WC 15, interpreted as the final surface of the Via Quintana. The Via Quintana ran NW-SE between the basilica and a large building 10m to the NE that was suggested to be the *praetorium*, or living quarters of the fortress commander (Phillips, 1995, 51). These surfaces were made of 'hard mortar and good packed cobble' with areas of patching and levelling consisting of flag stones and tile fragments. Together these surfaces produced only 16 sherds of pottery, mostly of 3rd/4th century date, with a single sherd of 10th/11th Torksey ware that must be regarded as intrusive; this relatively aceramic character was reflected in the much smaller recent excavations. They were stratigraphically associated with what appears to be a threshold through a doorway in the re-built rear of the basilica wall. This doorway survives in the treasury (Figures 6, 7 and 9, Plates 13, 14, 25-29), and was partially dismantled during the current works (see **6.8**). This feature was interpreted as one side of a wide double-doorway, (Philips, 1995, 51; archive notebooks), although the sequence of wear patterns suggests a more complex narrative. Furthermore, the published account regards this structure as a coherent, single-phased entity; the brief analysis possible during the current works demonstrates that it is actually composed of re-used elements of earlier doorways, and has in itself a long history of periodic modification.

The 1970 work recorded a massive grit-stone slab, WC 29, incised with false-jointing on the outer, north-east face, and set into the coursed limestone of the original wall. This block included a raised segment at its north-western end containing a pivot-setting that retained some of its ironwork, forming the socket for the hinge. Now positioned with this segment projecting upwards, it seems likely that this stone was originally a lintel, with the 'hinge-

socket' forming the upper fastening of a door, and that the entire piece has been re-tooled, including the false-joints.

Set on top of WC29 were three stone blocks, the upper surfaces of which were flush with the higher part of WC29 and ran to the south-east of it. The largest, WC30, was gritstone, measured 900mm X 700mm X 250mm and was flanked by two narrower, limestone blocks, WC44 to the north-west and WC31 to the south-east. WC 44 bore a large wheel rut, and the next stone, WC 30, bore a substantial lip on its exterior side, described as a 'stop-block' in the archive notes. This stone was removed in 2012 (see **6.8**), and is also considered to have once formed part of a different doorway, in this case a vertically-set jamb very similar to surviving stones at the amphitheatre in Chester. The next stone, WC 31, was also rutted, and was removed in 1970. The interpretative possibilities of this feature are only dealt with here insofar as they directly relate to the excavation of 2012; a full and detailed re-analysis of the structure in the light of the observations made here is recommended.

Placed in front of the threshold on the final 'cobbled' road surface, WC19, was a pair of re-used column bases which appeared to block access to the 4th century doorway and were suggested as a very late modification to the entrance (Figure 8, Plate 13). This was not interpreted any further, beyond a note in the archive that claimed it would have blocked the access to the threshold suggested by the wheel ruts (Graeme Guilbert's notebook). This observation did not make it into the publication but may be of significance to the late or even post-Roman phases of the site.

The sequence above the road surfaces was removed by the engineer's labourers and is therefore recorded in far less detail. Sealing the 'final road' was a sequence excavated as WC 13 and WC 14 that appears to group together a series of banded sandy-silts interpreted as the accumulation of waste in a period of 'disuse'. A large amount of pottery was recovered, mainly of 3rd/4th century date, which is currently regarded as residual. These deposits were noted in the archive to at least partially cover the threshold and relate to similar deposits in the room behind it. Overlying them was a complex sequence of crushed mortar layers that were grouped together as 'WC 6' and interpreted variously as ground make-up activity or as 'streets' in the archive, although of what specific date other than '?post-Roman' was never firmly stated (archive notes); once again they contained large amounts of probably residual late 4th century pottery. Importantly, this part of the sequence was never considered in depth in the publication, making a comparative modern hand-excavated sequence of great potential value. Above these 'streets', deposits were identified that elsewhere in the Minster sequence are associated with collapse-debris from the roof of the basilica, held to have finally come down in the 9th century (Phillips, 1995, 195). Sealing

these was 'WC5', an extensive series of banded ashy, sandy and mortary layers tentatively associated with a series of deposits referred to by the excavators as the 'ashy bands', which were also identified across the site and interpreted as having derived from the intentional final demolition of the *principia's* surviving elements, probably in the early Norman period, immediately prior to the robbing of the Roman walls when they were encountered during the construction of the cathedral in the late 11th/early 12th century.

The above is, necessarily, a summary; the section drawings and area notes hint at many more deposits and enigmatic features, including post-holes, that the original post-excavation analysis was not able to accommodate in the main sequence. This difficulty is chiefly the legacy of the extremely challenging excavation conditions, which did not allow for the careful, open-area style of excavation that such a complex and significant sequence deserves. The resulting data-set was consequently very difficult to analyse. In particular, the problem of spatially relating each excavated area to the others was a major undertaking, in an era before modern computing technology, which makes the task of relating disparate information infinitely easier. It is hopefully clear, therefore, that both the significance of the deposits, and the opportunity to refine the sequence with modern methods in controlled conditions, demanded the excavation of the deposits exposed after the concrete was removed in 2012.

## 6. RESULTS OF 2012 TREASURY EXCAVATION

The 2012 excavation was not as deep as that of 1970, and as is clear from Figures 4 and 5, there were deposits exposed 42 years ago that were not encountered recently. In particular, there is a layer of cobbles, sealed by a deposit of clay, which was interpreted in 1972 as the 2nd century road surface. Over this lay a new surface, WC42, on a thick bed of clay, related to the 4th century rebuild (Phillips, 1995, 165). It is possible that the lowest cobbles actually relate to the first, timber fortress, and were sealed beneath re-deposited natural material disturbed during the 2nd century re-construction of the fortress in stone, therefore dating WC42 to the 2nd century. This interpretation is suggested by the following description and subsequent analysis of both sequences, but it is important to state here that the volume of datable material recovered in 2012 was extremely small and that therefore absolute dates are difficult to ascribe. It should also be noted that samples were taken for optical spun luminescence dating from overlying deposits (Appendix 7), but that these could not be processed during this stage of the post-excavation process. Clearly, these hold potential for refining the following account, and should form part of any future analysis.

## 6.1 PHASE 1

The earliest phase comprised three groups of deposits and features, all of which formed successive metalled surfaces of a Roman road, the Via Quintana, with interleaved trample and possible patching deposits.

The earliest group, 1, consisted of deposits 6037 and 6036, in set 1, and 6035 in set 2.

6037 was a compact, brown sandy clay with moderate pebbles and very occasional CBM and limestone fragments, interpreted as a make-up deposit for the overlying road surface 6036. This surface was very compact, and constructed with carefully laid large cobbles and small pebbles (Plates 5 and 7). It was black, in contrast to the later surfaces of this phase, and exhibited a distinct if shallow down-slope to the north-east from c.13.03 to 13.00m AOD, interpreted as evidence for possible erosion caused by traffic.

Overlying the road surface was 6035, a very thin layer of firm, mid grey-brown gritty silt with frequent pebbles and fragments of mortar and CBM, interpreted as a trample deposit rather than a levelling deposit for the next road surface (6033) as it was relatively insubstantial and closely followed the contours of 6036, firmly packed into the interstices between the cobbles. The environmental analysis produced a significant deposit of heavily oxidised nails and metal working debris, which given the limited excavation area may represent casual loss rather than indicate nearby metal working. Deposit 6035 produced the only pottery of this phase, largely of late 3$^{rd}$ to 4$^{th}$ century date but with a possible mid 4$^{th}$ century dish (Appendix 2); the small sherd count limits the scope of this date, but as 6035 is a well sealed context it may serve as a guide.

The next group, 2, consisted of deposits 6034, 6033 in set 3 and 6032 in set 4.

6034 was a compact deposit of packed limestone and CBM fragments in a matrix of buff-coloured sandy mortar with occasional pebbles and charcoal flecks. 6034 filled the distinct 'dish' formed by the slope of the underlying road surface, and was interpreted as a levelling deposit for an overlying surface, 6033 (Plate 8). This surface was formed by very compact small-medium sized pebbles and medium sub-angular sandstone fragments in a friable mid brown sandy mortar with occasional CBM and was level at 13.11m AOD. As it filled a lower depression, this may represent a repair rather than a completely new surface.

Surface 6033 was sealed by 6032, a firm-friable mid-light brown sandy silt with moderate CBM and charcoal flecks and occasional small pebbles and sandstone fragments. In general, 6032 was considered too ephemeral to be a levelling deposit associated with the

overlying road surface (6031) and was instead regarded as an accumulation of debris; it was environmentally very similar to 6035, with probable re-deposited hearth waste and metal fragments. However, this deposit contained a concentration of sandstone fragments in the north-east corner, which were removed with 6032 as the underlying road surface was clearly a distinct entity beneath it; it may be that this change reflected an additional surface repair or the in-filling of a rut prior to re-surfacing, but an insufficient area of the road was available to be confident of this interpretation.

The last group of this phase, 3, consisted of deposit 6031 (Plate 9). This deposit formed the final observed road surface and was formed by very compactly laid small and medium black pebbles set in a very hard creamy white mortar, with several patches of crushed tile that were interpreted as repairs rather than as part of the original surface, although in such a small area this is not certain. It was noticeable that there was no distinct underlying make-up or bedding deposit other than the mortar which the cobbles were set in, suggesting perhaps that when seen in a wider area 6031 might in itself represent a repair rather than a distinct road surface in its own right, although the coherency and quality of the cobbling was very good. This is discussed further in section **7**, where this sequence is analysed in conjunction with the wider area recorded in 1970.

## 6.2 PHASE 2

Phase 2 consists of a single deposit, 6030 (Plate 11), in group 4. This consisted of a layer of 23mm thick sandstone fragments with occasional CBM in a matrix of soft, friable grey silty sand that environmental analysis revealed contained significant concentrations of domestic food waste, including fish scale and eggshell, suggesting a mixed origin. This deposit formed a coherent layer at around 13.21m AOD over the Roman road surface 6031 and unfortunately contained no specifically datable material. The sandstone fragments were identified by Jane McComish as roof flags, some of which match known types from elsewhere in York (Appendix 4), suggesting the presence of a nearby stone roofed structure. Interestingly, the entire treasury sequence contains proportionally more fragments of imbrex than tegula; this is highly unusual in York, being the reverse of the normal pattern, and would only be expected if the roof concerned were stone-flagged with a ridge of imbrices, rather than constructed traditionally with tegulae (Jane McComish, pers. comm.; see section **7**).

Given the small size of the excavation, it cannot be certain if the flags were intentionally laid as a surface, or if they represent the *in situ* remains of a fallen roof but the evidence suggests an alternative explanation. The stone flags were too thin to function as a useable surface (J McComish, pers. comm.), and although generally flat, they did not appear as if they were intentionally laid as the soil matrix was integral to the deposit rather than forming a

distinct bedding material, and there were no 'plugs' for the many gaps between the edges of the stones. Equally, the high quantity of domestic waste might suggest that rather than representing a fallen roof, this deposit represents levelling, using material derived from a nearby fallen or perhaps demolished roof, mixed with midden material. Whichever is the case, the implied presence of a stone-roofed structure nearby is potentially of great significance.

### 6.3 PHASE 3

This phase comprises two groups of deposits that consist of levelling and make-up deposits for two distinct surfaces of unknown purpose.

Group 5 consisted of deposits 6029, 6028, and 6027. 6029 directly overly the probable collapsed roof 6030 and was a levelling deposit of compact-friable, creamy mortar mixed with moderate CBM and sandstone fragments, along with a single sherd of 3rd century greyware. Overlying this was 6028, a compacted layer of friable buff-brown mortar with moderate-frequent CBM fragments and occasional small black pebbles and patches of mortary mid brown sandy silt. Although sufficiently compact to have formed a crude surface in its own right, the mixed nature of this deposit suggested its interpretation as make-up/levelling for 6027. This was a very compact mid-brown mortar with frequent small pebbles and moderate small crushed tile fragments that lay at c.13.30m AOD and on the basis of the coherency of its appearance and consistency was interpreted as a surface (Figure 5, Plate 15). It is possible that this group is actually a series of make-up deposits formed the bedding material for a subsequently robbed flag stone surface, which would have produced a compacted and level appearance to 6027. This pattern may be seen throughout the Phase 3 deposits, suggested by their level, closely-banded nature, in contrast with the Phase 4 sequence, discussed below in **6.4**.

The next group, 6, comprised deposits 6026-6021. The first two, 6026 and 6025, consisted respectively of an ephemeral soft brown-red grey ashy silt with frequent charcoal fragments and flecks, and a firm, slightly orange grey-brown, slightly clayey silt with moderate charcoal fragments and flecks, fragments of burnt daub and a single 3rd century greyware sherd. Both the charcoal and daub in 6025 were highly fragmentary and suggestive of hearth waste rather than the destruction of a structure. Additionally, 6025 produced the only freshwater snail in the entire assemblage, perhaps indicating nearby standing water. Together, these deposits brought the ground level up to 13.34m AOD and were interpreted as levelling deposits of burnt material, possibly deriving from nearby domestic or industrial hearths; these may match deposits seen in 1970 and are discussed further in **7**.

Overlying this was 6024, a layer of friable, mid grey sandy silt with frequent CBM fragments, pebbles and mortar, which could conceivably have functioned as a crude surface but sloped to the south from 13.36 to 13.40m AOD and was very mixed, suggesting alternatively that it was a make-up or bedding deposit. The overlying material, 6023, consisted of sandstone flag fragments in a matrix of soft, yellow-brown sandy silt, with frequent charcoal flecks, occasional pebbles and oyster shell fragments that could represent a dump of demolition material mixed with domestic food waste, used as a further levelling or make-up deposit. A single sherd of possible 3rd century pottery is probably residual, given the ceramic dates for earlier deposits. The evidence for food waste included a significant quantity of fish scale not normally associated with late or even post-Roman deposits in York (Appendices 5 and 6). Some of 6023, in particular the sandstone flag fragments, could be re-deposited from the collapsed roof or could represent a demolished structure nearby. Additionally, a >1mm scrap of gold foil was recovered from the environmental sample that may indicate local industrial activity. 6023 was too irregular to be considered a surface in its own right.

Overlying 6023 was 6022, a concreted but fairly loose layer of limestone fragments and pebbles in a pale brown mortar, with moderate CBM fragments and occasional flecks of charcoal and light grey mortar. This deposit was 0.15m thick, and very level at 13.55m AOD, and was interpreted as a sub-floor bedding deposit. Overlying it was 6021 (Plate 16), a 0.03m thick layer of firm, grey-brown sandy silt with occasional clean white mortar lenses and frequent small charcoal fragments, pebbles, CBM flecks and a patch of flat-laid sandstone fragments. Once again, this material probably derived from hearths and domestic waste, although in lesser quantities than similar earlier deposits. 6021 was very level at 13.58m AOD and markedly different from any other layer or 'surface' identified in the excavation; it was initially interpreted as an internal floor. When viewed with the rest of the sequence, however, it seems likely that it together with 6022, 6021 formed the compacted bedding material for a paved surface that was subsequently removed.

Deposits 6021 and, 0.28m further down, 6027, seemed to provide evidence for being distinct surfaces, or the uppermost surviving bedding material for paved surfaces. The equivalent part of the 1970 sequence indicated that similar deposits were found across much of the treasury area, on both sides of the basilica wall, which potentially suggests a considerable alteration of the landscape in what may be the post-Roman period.

### 6.4 PHASE 4

The deposits in this phase were arranged into two groups, and were chiefly distinguished from the phase 3 series by their more tightly banded appearance and apparent interleaving of distinct 'surfaces' with 'tramples', all of which exhibited a tendency to slope downwards to

the north-west (Figure 5, Plates 3 and 4) and were suggestive of more 'exterior' types of activity than those of phase 3.

Group 7 comprised a surface with attendant make-up deposits, and a probable erosion scar indicating the use of that surface. The earliest deposit was 6018, a friable, mixed light brown silty-sand with mortar, pebbles and occasional CBM and charcoal, which although fairly level on the eastern side at around 13.68m AOD, was nevertheless considered too mixed and insufficiently compacted to represent a surface and was instead regarded as a make-up deposit. Overlying it was 6017, a 10mm thick layer of friable, brown-grey sandy silt with occasional CBM, charcoal and white mortar flecks, interpreted as a thin layer of trample, sealed beneath 6016, a 20mm thick layer of compact-friable off-white mortar (Plate 17). This contained pebbles and CBM and was considered to be a surface, at 13.73m AOD.

This surface and the underlying deposits all exhibited a 'hump-back' profile sloping very slightly down to the south east, and relatively steeply down to the north-west, where the upper surface of 6021 had been exposed at 13.58m AOD. Cut into this was 6020, a shallow sub-oval depression 0.30m across and 30mm deep, aligned approximately east-west. This was filled by 6019, a friable dark grey ashy silt with frequent charcoal fragments and occasional pebbles, interpreted as a backfill deriving from possible hearth-waste. What survived in plan of 6019/6020 was insufficient to securely stratify them as cutting into surface 6016, but the consistent NW down- slope of these deposits lead naturally into 'cut' 6020 and it is not unreasonable to consider 6019/6020 to be the basal remnant of an erosion scar that removed surface 6016 and its make-up deposits, cutting into the underlying 6021. With so little of the deposit exposed it is not possible to know if the down-slope to the NW would have had a parallel slope meeting it from the other side of a putative rut, but if it did this would have been aligned SW-NE, and located to suggest continued traffic through the former *basilica* doorway. Given the limited area available for excavation, it is more reasonable to interpret 6020 as a pot-hole, with an approximate radius of 0.80m, and deposit 6019 as an attempt to fill it; this deposit was confined to the lowest part of 6020 and was not considered to have accumulated gradually in the pot-hole because it was not present on the higher eroded slope.

Sealing the backfill 6019 and the remains of surface was the first deposit of group 8, 6015, a very thin layer of compact-friable, brown grey sandy silt with charcoal and CBM that followed the underlying slope and was interpreted as trample. Overlying this was 6014, a layer of compacted but friable, grey-brown mortar with frequent pebbles, moderate CBM fragments and lenses of dark grey sandy silt to the north, which was sufficiently compact and uniform to regard as a surface (Plate 18). It was thicker at the northern and southern ends, as it made-

up the underlying slope to be generally level at c.13.78m AOD, although very slight dip above the underlying slopes was still apparent.

Taken as a whole, these two groups represent successive surfaces, with the trampling, erosion and need to re-surface 6016 with 6014 interpreted as evidence for renewed activity in the area. These surfaces are level with the Anglian/Anglo-Scandinavian cemetery identified in the *York Minster Revealed* lift shaft excavation (Milsted, 2012, 10, 17-18) and the 1960s (Phillips, 1995, 75) and may represent a road or level area associated with that cemetery (see section **7**). They may alternatively relate to the next phased activity, but are separated on the grounds of their sloping profile; this may be the result purely of localised traffic rather than a significant difference in land-use across the whole area.

### 6.5 PHASE 5

This phase consists of a single group, 9, which was the earliest to be observed across the entire excavation area rather than in just the deeper southern half, and represented a further sequence of make-up, trampling and possible surfacing. It may be that its distinction as a separate phase may be a product of how much was visible, as small variations in profile tend to seem more significant when seen in a small area, and that in fact group 9 is merely the ultimate in the series of similar surfaces described above.

Group 9 commenced with 6013, a 30-40mm thick friable, light yellow-brown sandy mortar that contained moderate CBM fragments and occasional black pebbles, along with frequent lumps of mortar that appeared to retain some structure and may have come from a near-by building (Plates 19 and 20). That they were not crushed lead to an interpretation of 6013 as a make-up deposit rather than a surface, and reinforces the idea of demolition activity occurring in the area at this time. This was sealed beneath 6012, a 30mm thick layer of trample consisting of a compact-friable, mid grey, very sandy gritty silt, that was in turn sealed beneath 6011, a compacted layer of lime mortar with CBM fragments and patches of fine grey-brown sand that was distinctly more pebbly at its northern end and was interpreted as a surface at c.13.85m AOD; 4 sherds of 3-4$^{th}$ century greywares were clearly residual.

Although difficult to interpret, it is possible that this phase represents the clearance of structures associated with the construction of the Norman cathedral from c.1080; this is suggested by evidence in the wider archive, but is not supported by any dating evidence.

## 6.6 PHASE 6

This phase comprises a single group, 10, that is characterised by consisting of far greater depths of ground make-up deposits that seen in the more closely 'banded' profile of earlier phases.

Group 10 commenced with 6010, a layer of mixed firm-friable mid grey sandy-silt with clear mortary lenses and bands of dark grey silt. Significant quantities of CBM and mortar were recovered from the samples, along with residual late 3rd-4th century pottery, domestic food waste, burnt seeds and hearth debris. At between 50-100mm thick, this deposit was uneven and interpreted as a sequence of different levelling deposits compacted together by the trampling of feet; two different types of snail favouring woodland litter and open grassland may support a mixed origin, perhaps partially from re-deposited midden. Sealing 6010 was 6009, a very similar compacted mid grey-brown sandy silt but containing far more CBM and limestone fragments with lumps of mortar and far fewer mortary lenses. Together, these deposits brought the ground level up to c.14.05m AOD.

Overlying this was 6008, a 70mm thick layer of compact-friable, very dark grey silty sand with moderate-frequent CBM and limestone along with occasional mortar flecks and animal bone fragments. This was interpreted as a levelling deposit of mixed demolition and domestic waste, and was sealed by 6007, a 20mm thick layer of loose mortar and soft mid grey sand with frequent small CBM fragments, interpreted as a trampled construction deposit at c.14.15m AOD (Plates 21 and 22). The pottery from this context, though limited, was mainly of 15th century date, and suggests that this phase may relate to the construction of the eastern arm by 1420 and the tower, which was completed by 1472 (Brown, 2003, 169 and 195).

6007 was sealed by two extensive deposits of waste material and soil, interpreted as part of the significant amount of ground-raising that may be associated with the establishment of the 15th century interior floors. 6006 was a 40m thick layer of firm-very friable dark grey silty sand with occasional flecks of mortar and charcoal that contained CBM, along with carbonised seeds suggestive of cereal processing and some industrial slag. 6006 was sealed beneath 6005, a layer of firm, mid brown-grey slightly silty sand with moderate charcoal flecks and occasional sandstone fragments with mortary lenses, along with a significant amount of industrial slag. This deposit was up to 0.40m thick and had been truncated by the nineteenth and twentieth century activity of phase 7.

These groups were phased together on the basis of their morphological similarity; it may be that further comparative analysis with the wider archive can refine this sequence. In

particular, deposits 6010 and 6009 may relate to internal make-up deposits associated with the Norman construction activity of Phase 5, raising the point of 15th century truncation from 13.88m to 14.00m.

## 6.7 PHASE 7

The final group of deposits, 11, consisted of two large foundation cuts, 6003 and 6004, that were up to 1.10m across and 0.80m deep, and contained the footings, 6001 and 6002, for the nineteenth century crypt piers (Plates 23 and 24). These foundations were made of very compactly mortared limestone rubble and could only be removed using a power drill, in testimony to the quality of the post-1837 fire engineering. Finally, the far more extensive works of 1967-1970 had replaced the nineteenth century treasury floor in concrete up to 0.30m thick, and created the well into which the new staircase and platform lift are located.

## 6.8 RECORDING AND DISMANTLING THE BASILICA WALL

The basilica wall identified and recorded in 1970 as WC 16 was re-recorded following the decision to remove the central gritstone 'stop block' to allow sufficient space for the new platform lift (Figures 6,7 and 9, Plates 25-32). This stone, originally recorded as WC 30, was re-numbered 6038 to retain the integrity of the 2012 sequence. It was lifted and replaced at the far south-eastern end of the basilica wall, behind a new partition in the renovated Treasury. With reference to the comments made in **5.2**, this stone is thought to originally been a vertically-set jamb, and is also so worn as to suggest water-action at some point. This may mean that it was re-set at least twice, in different structures of different purpose, and at the very least demonstrates that a detailed re-study of the wall and its constituent elements is now required.

A deposit of soil, 6044, was identified and sampled between block 6038 and the rutted limestone block immediately to the north-west, originally recorded as WC 44 and re-numbered 6054. Below 6038, a soil deposit was sampled as 6039, and the underlying mortar as 6046. South-east of 6038, the mortar bedding for the now missing stone recorded as WC 31 was sampled as 6047. Unfortunately, these samples proved uninformative, being contaminated with modern materials as a result of having been exposed for over 40 years.

The gritstone base of the threshold, originally numbered WC 29, had become damaged at an unknown date. Part of the higher north-western segment that formed the hinge-post of the doorway had fractured and slipped (compare Plate 26 with Plates 27 and 32). This new fragment was numbered 6040 and removed; it is now located with stone 6038. The remaining stone, which bears incised false jointing and forms the foundation of the threshold, was numbered 6053. A deposit of soil, 6041, was recovered from beneath fragment 6040

and was sampled; the iron pivot hole fitting was numbered 6050 and all the loose fragments removed for study (Appendix 3).

The lower 3 courses of wall WC 16 projected 0.14m beyond the line of the upper, and were numbered 6052; the mortar was numbered 6049 and sampled. The upper courses, of which only two survived, were numbered 6051, with the mortar sampled as 6048. The threshold described above was cut through the upper courses, with gritstone base 6053 sitting directly on top of the lower stonework of 6052. Immediately north-west of 6053, a single limestone block from 6051 had been disturbed by the movement of fragment 6040 and this too was removed. It was numbered 6042 and placed with the other disturbed stones; a soil, 6043, was sampled from beneath it, as was its mortar bedding, 6045.

The general condition of wall 6051/6052 was poor, with many blocks of 6051 in particular being loose. This part of the wall is sealed below the new Treasury floor and its stones are, for now, safe from further disturbance although they may still be affected by damp. The only other feature of note from this wall was 6055, a deposit of compact, buff mortar adhering to the north-east face of 6052 some 2.5m to the north-west of the threshold. This was 0.60m across and up to 0.20m high, and at only 16mm thick was interpreted as the remains of a mortar joint for a small wall abutting the basilica wall from the north-east. It is not possible within this report to further analyse this feature, but it is recommended that a close study of the archive records be made to confirm and interpret it.

## 7. ANALYSIS OF THE 2012 RESULTS WITH THE 1970 SEQUENCE

The 1970 sequence, summarised above in **5.2**, has been re-analysed in conjunction with the 2012 sequence, but this process has been limited to the area of section WC1 and the basilica wall. The rest of the treasury area was recorded in another 16 sections, all of which should be included in a wider, more thorough analysis that takes fuller account of the entire Minster sequence. What is presented here stands as an initial assessment of the potential of this process, along with an interpretation of the 2012 excavation results.

It has been possible to directly correlate many of the deposits recorded in both excavations, although their interpretations significantly differ in places. This, along with the deposits that cannot be correlated, demonstrate the dangers both of solely recording in section, and of over-interpreting sequences recovered from very small excavations, along with the challenges of uniting sequences excavated by different people. I have attempted here to

strike a balance between the conflicting interpretations and limitations of both sequences, whilst trying also to come to a conclusion that provides a basis for further work.

Above the possible road exposed at the base of the 1970 excavation and not reached in 2012, the road surfaces identified in Phase 1 correlate reasonably well with Phillips' sequence, and confirm the identity of the Via Quintana. The surfaces identified in 1970 were observed across a much wider area than those seen in 2012; additionally, both sections cut obliquely across the course of the Via Quintana, and this has to be taken into account when determining what is a complete surface and what is a localised repair. Indeed, it may be that distinguishing between these is not actually possible; it is also likely that different phases of repair and re-surfacing will interlace with one another in a way not easily understood in small, unconnected excavations that have only sampled a tiny fraction of the whole road. However, broad coherent surfaces can be identified between the two sequences.

## 7.1 PHASE 1

The earliest deposit seen in 2012, make-up 6037, matches the level and description of make-up WC 51, with the overlying surface 6036 relating to WC 42, identified as the cobbled surface of the Via Quintana at 42.64ft/c.13.00m AOD (Plates 5 and 6). This interpretation is supported by the recent work. Both WC42 and 6036 were overlain by correlating trample deposits, WC41/6035, both of which produced pottery of late 3rd/4th century date. Surface WC42/6036 may relate to the 2nd century rebuild of the fortress in stone, or could date from the 4th century re-build; the earliest surface identified by Philips (Figure 4 section) may represent the original, pre-stone surface or the 2nd century one. This uncertainty is clearly unsatisfactory; a detailed analysis of the wider archive is necessary to resolve this issue, but it is currently felt that the clay beneath surface WC42/6036 represents re-deposited natural disturbed from digging the stone foundations in the 2nd century, with WC42/6036 then being laid.

Surface 6033 has no direct parallel, but surface 6031 clearly relates to the 'hard mortar and cobble' surface of WC39a at 43.40ft/13.23m AOD (Figures 4 and 5, Plates 9 and 10). WC39a overlay WC42 and was up to 0.25m thick. It was also quite variable; beneath the 'durable' cobbles at the top of the deposit was a mixture of 'flags and stone rubble set in hard light buff-grey mortar' (archive notes), indicating that the surface had been removed along with its make-up. Deposit 6032, which overlay surface 6033 and contained concentrations of sandstone fragments, could be interpreted as levelling or bedding for 6031 (recorded on-site as lacking a make-up deposit) and may therefore relate to the mixed sub-surface elements of WC 39a. This would support the interpretation of surface 6033 as a repair to the original road surface 6036/WC42, matching its quality, and being subsequently incorporated into and

superseded by 6031/WC39a to create a new, coherent and level metalled surface across the whole observed area, at some point in the 4th century, possibly during the later *basilica* re-build.

Plate 14 shows the various surfaces identified in 1970 during excavation. Deposit 6031/WC39a is the last cobbled surface to appear in both sequences and is currently taken as the last complete surface of the Via Quintana; the 1970 analysis identified later 'Roman' surfaces but the nature of these is open to doubt. Perhaps significantly, the level of 6031/WC39a equates with that of the 'threshold block' 6053/WC29 in the basilica wall. The likelihood that this doorway was re-modelled is supported by the observation that the Phase 2 and 3 deposits and surfaces, which are very different in character, appear to relate to the 'stop block' 6038/WC30, suggesting that stone WC30/6038, and the others in its course, may have been re-set. This implies continued alterations to the basilica rear wall after the suggested 4th century re-build, and demonstrates the necessity of more detailed analysis.

## 7.2 PHASE 2

The interpretation of Phase 2 levelling deposit 6030 relates to the variability of surface W39a. An apparently related deposit, WC 39b, is described as a partial 'resurfacing' of 39a using 'grey flat stone slabs and roofing tiles' (archive notes). It is described as 'patchy' and does not appear in every drawn section as it was not a complete re-surface. However, at c.13.25m AOD, this is level with deposit 6030 and very similar to it in description; Plates 11 and 12 strongly suggest they are the same deposit. Neither is particularly convincing as a coherent surface, however, despite Phillips' interpretation, as the 'slabs', which have been identified in 6030 as roof flags and strongly resemble the stones in WC39b, clearly overlap and are not level.

Any attempt to claim 6030 as an *in situ* collapsed roof is also problematic, as Plate 12 clearly shows WC39b embedded into surface 39a. However, the material that forms 6030/WC 39b probably does come from a nearby stone roof, either collapsed or demolished, and re-deposited. The environmental evidence for significant quantities of domestic waste, taken with the character of deposit WC39b, suggests that 6030 was in fact used across the wider area as a crude levelling deposit across the surface of road 6031/WC39a. The small size of the 2012 trench probably masked this fact; although the surface 6031 revealed beneath it was sound, it may well have formed part of a wider depression, the limits of which lay beyond the visible area. When this was done is not clear and whether it created a usable surface or was part of making up the ground to create a higher surface, is debateable. The source of the material used, however, is potentially very significant.

Recent research suggests that there is a pattern for stone roof flags to be used in preference to tegulae in the later Roman period throughout the city (J McComish pers. comm.). Given that the radically different roof support structure required for either technique does not allow for a 'mixed' or 'patched' roof using both stone and tile (J McComish, pers. comm.), it seems very likely that at least one of the late Roman buildings in this part of the fortress was roofed in stone in its final phase. The proximity of the basilica to the excavated area may suggest that the final roof borne by the fortress headquarters was of stone, but the small-scale of this excavation must be acknowledged. The sample may not be representative of the wider area, and the imbrex/tegula ratio may not hold true in the 1970s assemblage. Additionally, elsewhere in the fortress the evidence points to a tiled roof having survived into the post-Roman period (archive records, particularly for the South Transept trenches). Despite these caveats, however, this new information provides an interpretative challenge for future analysis.

### 7.3 PHASE 3

6030 represents a significant change in character from the underlying cobbled surfaces. The subsequent phases of surface are very different indeed, and represent significant changes in land-use and status. This activity includes further structural activity that post-date surfaces which seal deposit 6030, making it less likely that the roof flags within context 6030/WC 39b relate to the final basilica roof, suggesting instead a different building.

The earliest group of Phase 3 deposits consisted of the make-up deposits and material of a surface, 6027, a compact brown mortar containing pebbles and crushed tile at 13.30m AOD. This level and description equates with a 'road surface' identified by Derek Phillips, WC 34, which was a red-brown mortar with tile and cobbles at 43.40 feet (archive notes). Significantly, this was also described as 'an inferior road-metalling to Road (WC) 39 (6031)' that was 'so poor that it had to be repaired' by an overlying deposit of cobbling, WC 19. Surface 6027 was interpreted as possibly forming the bedding for a subsequently robbed paved surface; certainly it did not appear sufficiently robust to function as a road, especially in comparison with the cobbled surfaces discovered beneath it.

The 'repair' WC19 identified by Phillips did not appear in the 2012 excavation, but it was possible from the archive to place it immediately above surface WC34/6027 but below the later Phase 3 deposits 6025 and 6026. WC19 was a 1.5m strip of heavily worn but well-laid cobbles that appeared to be the last active surface associated with the threshold in the basilica wall. Importantly, placed on top of it were two re-used column bases that seem to form a monumental porch, beyond which the cobbles stopped (Plate 13). They were sealed in turn by WC15, a 'paved surface' of Roman roof flags (archive notes) that also did not

extend to the 2012 section. This probable late Roman structure is significant in its own right, but becomes more so when associated with the likely change to the Via Quintana surface. Whether paved, as suggested by the laminated appearance of deposits 6029, 6028 and 6027 or perhaps merely roughly surfaced, it suggests a dramatic change in the status or the road and perhaps of the buildings flanking it.

The deposits immediately overlying 6027 have a close correlation with deposits in the 1970 sequence that seal the threshold and accumulate around the column bases, suggesting that the entrance had gone out of use. 6026 and WC 14 are charcoal-flecked silts at 43.70/13.32m and lie beneath 6025 and WC 13, which were both firm-compact orange-brown clayey silts with burnt material within them at 13.34m AOD. The 1970s deposits were linked to similar material accumulating within the basilica and over the threshold, and were held to represent the 'beginning' of the post-Roman period (archive notes). Above these, a 'level paved surface' of 'thin flat stone slabs and Roman roofing tiles' was recorded as WC 11a at 43.80/13.35 that bears comparison with 6023, interpreted as a make-up deposit containing quantities of roofing material. Once again, it is possible that what appeared in isolation to be too uneven for a surface could over a wider area appear level enough to consider as such; although the flags of 6023 were clearly roofing slabs and very uneven, they had developed root-paths in the soil matrix beneath them, suggesting perhaps that they had been the uppermost exposed surface for a while. The overlying deposit, 6022, resemble the lowest layers of WC 6 at around 44.30/13.55m, a group of crushed mortar and pebble laminations identified as 'surfaces' but not interpreted further by Phillips. Above these was the second 'surface' of Phase 3, 6021, the possible bedding material for another paved surface.

These surfaces were not interpreted by Philips, but represent potentially the most important in the sequence. The environmental evidence supports a continuation of occupation, with the amount of domestic waste and hearth-derived charcoal in the bedding deposits below the possible paved floors. This 'internal' interpretation, so different in character from the lower archaeology of the Roman road surfaces, may be an elusive glimpse of the early post-Roman or perhaps the Anglian landscape. The stratigraphic analysis presented in this report is sufficient to identify their unique character and isolate their position in the sequence; further analysis will require processing the specialist samples and a much more detailed study of the wider 1970s archive.

### 7.4 PHASE 4

Above 2012 Phase 3, the level of recording possible in 1970 does not allow for the close direct correlation of most of the recently excavated deposits, but the general pattern is

comparable. WC 6 comprises a sequence of laminated mortary deposits up to 0.45m thick that are referred to as 'abandonment' deposits and include several surfaces tentatively identified as 'streets' by Phillips. The 2012 deposits support this to an extent, giving the impression of a cleared, 'exterior' landscape, with some evidence for the re-establishment of a thoroughfare represented by surface 6016, and a good match for 6014, the final surface of Phase 4 at 45.14/13.76m. This level is significant, as it represents the height of the Anglian/Anglo-Scandinavian cemetery identified in the 2012 Lift Shaft excavation (Milsted, 2012, 8-10) and may support the theory that this graveyard was established in the footprint of the former basilica in the early-mid 9th century (Ibid, 17-18) by identifying an associated road behind it. This road, and the lack of any human bone in associated deposits, may suggest the survival of the *basilica* walls as the cemetery boundary, although a wider detailed study is necessary to corroborate this. However, the presence of a renewed road in the location of the Via Quintana may reflect a pattern seen elsewhere in the later Anglian city of re-established roads in the position of former Roman roads that respect surviving or re-used elements of the Roman buildings (Tweddle, 1999, 151-2). The pot-hole and re-surfacing suggests the relatively frequent use that would be expected close to an active cemetery in an area thought to be the location of the pre-conquest cathedral (Norton, 1999,1-15), and may indicate the survival of the *basilica* doorway as an access, although the limited 2012 excavation area must be acknowledged.

### 7.5 PHASE 5

Overlying the surfaces in the 1970 group WC6 was an 'impressive layer of mortar, stones, large tile fragments with plaster face down' at 45.40/13.83 which is interpreted as a spread of demolition material, possibly from a 'building on other side of street' (archive notes). This deposit correlates very closely with 6013 at c.13.85m AOD, which contained large uncrushed mortar fragments and was considered to be a spread of demolition material. The 1970 analysis associated this layer with deposits seen within the principia that contained large quantities of rubble and particularly roof tiles, and were interpreted as the collapse of demolition of the principia by the 9th century (Phillips, 1995, 194-195).

The current interpretation is that the Roman buildings did contribute to this material, but during the clearance associated with the late 11th century construction of the Norman cathedral after 1080, either directly with the demolition of surviving buildings or ruins, or indirectly with the removal of structures that incorporated or re-used Roman buildings or materials. This is based on the underlying Phase 4 'cemetery road', which if correct would date to the 11th century. Additionally, at 13.75-13.80m AOD, the Treasury 'Norman horizon' is within 50mm of the Norman construction level identified in the South Transept area (Milsted, 2012, 11), although it is 1.10m lower than that seen within the crossing (archive

notes). This disparity may be reasonably explained by truncation. Both the South Transept and Treasury Norman phases had been heavily truncated by 13th and 15th century activity respectively, and may originally have survived to a comparable height to that seen elsewhere; certainly, the height of the Norman foundations in the Treasury area, at 50.06'/15.25m AOD, matched that recorded elsewhere (archive). Later activity in the transepts and east end cut down between these foundations into earlier deposits; in the crossing, it seems that the later construction of the tower did not impact so heavily on the below-floor strata. This may be explained by the suggestion that the 1470s tower replaced one that had partially collapsed, incorporating its remains at a level well above the floor (Brown, 2003, 195).

## 7.6 PHASE 6

Above c.13.85m AOD, the final group of 1970 deposits was WC 5, which consisted of accumulating soil and occasional mortary lenses. These correlate with the 2012 sequence: 6009 matches a layer of mortar with a possible posthole, and the construction spread 6007 relates to a layer of 'mortar and small pebbles'.

The 1970s interpretation equated WC5 with deposits seen elsewhere in the Minster and related to the process of demolishing the surviving Roman remains prior to the construction of the Norman cathedral (dubbed the 'ashy bands'). However, these demolition deposits lie at least 0.50m lower elsewhere in the cathedral, below the Anglian/Anglo-Scandinavian cemetery, and have been shown to be 9th or 10th century in date (Milsted, 2012, 17) rather than mid-late 11th. Crucially, the 15th century pottery assemblage from 6007 suggests that the construction of the eastern arm in the decorated style, completed by c.1420, truncated the earlier deposits in this area to at least 14.00m and possibly 13.88m AOD during the demolition of the 12th century Quire, itself a replacement for the 11th century version. Deposit 6007 is therefore a construction spread of trampled mortar associated with the 15th century building work as the new east end was articulated with the central crossing, and the overlying deposits represent in-filling with re-deposited material to match the floor level of the crossing. The sequence of deposits produced by this process strongly resemble that of the Norman sub-floor levelling seen throughout the crossing area (Archive and Phillips, 1985,131-137) because the processes were essentially identical, but carried out 400 years apart.

## 8. RESEARCH POTENTIAL

The 2012 Treasury excavation and analysis has shown the potential for a wider, detailed analysis of the Minster's stratigraphic archive in all the periods represented here. This should include both the 1960/70s material and the modern sequences obtained during all the *York Minster Revealed* fieldwork, along with the specialist soil micro-morphological and optical spin luminescence samples taken during the 2012 fieldwork (see Appendix 7).

The ambiguities in the exact sequence of the *basilica* walls and doorway, and the surfaces of the Via Quintana, suggest that the Roman narrative in *Excavations at York Minster Volume 1* can be significantly refined. In particular, the 4th century re-build of the *basilica* is contested (Ottaway, 1997, 509), and the possibility of later modifications suggested here is potentially very significant.

Most importantly, for York and for the study of the post-Roman period nationally, the current work has identified structural activity of probable Anglian date in the form of floors and possible adaptations to the Roman remains that merits close comparison with the wider fortress area. This period represents the flowering of York's influence in the Anglian Kingdom of Northumberland, and yet is woefully underrepresented in the archaeology of the wider city (Tweddle, 1999, 116). Of particular relevance is the landscape of the Anglian Cathedral long thought to be located within the current Cathedral close (Norton, 1999, 4); any opportunity to refine this landscape, and in particular to understand its development from the Roman period, must be regarded as a priority in future work. Similarly important is the wider landscape of the Anglo-Scandinavian cemetery and its probable Anglian precursor; these clearly relate to considerations of the cathedral environs and how they developed into the Norman period, and the possibility of an active road-way, perhaps servicing the cemetery and any related nearby buildings, is of great significance.

The evidence for the 11th and 15th century cathedral builders provides an opportunity to revisit the sequence that lead ultimately to the church that stands today. This is the subject of on-going research and may help to refine the sequence published in 1985 as *Excavations at York Minster Volume 2*.

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## APPENDIX 1: FIGURES AND PLATES

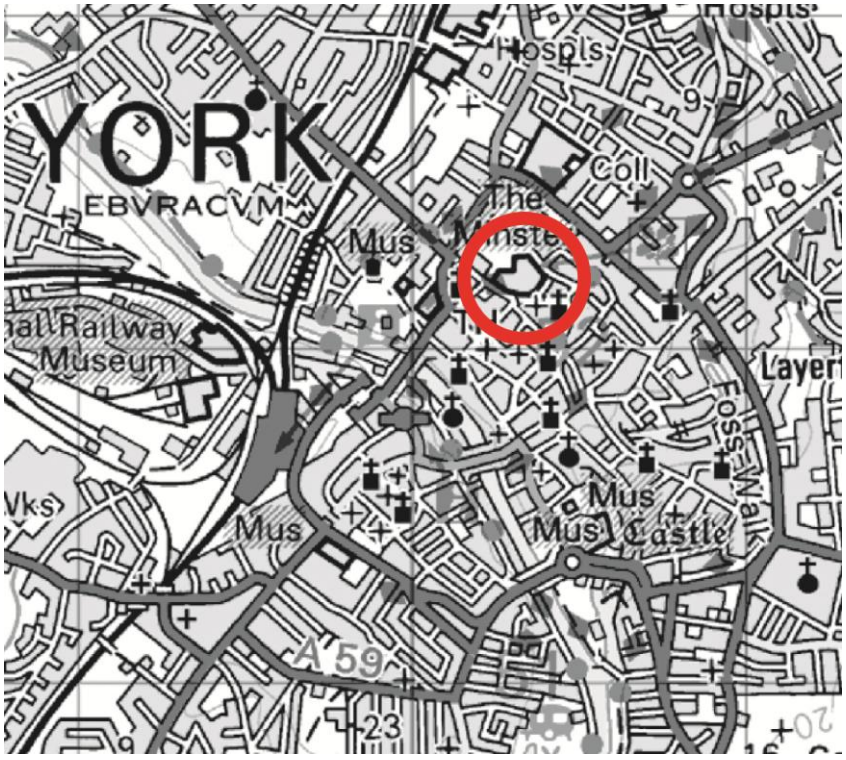


*Figure 1 Site location*

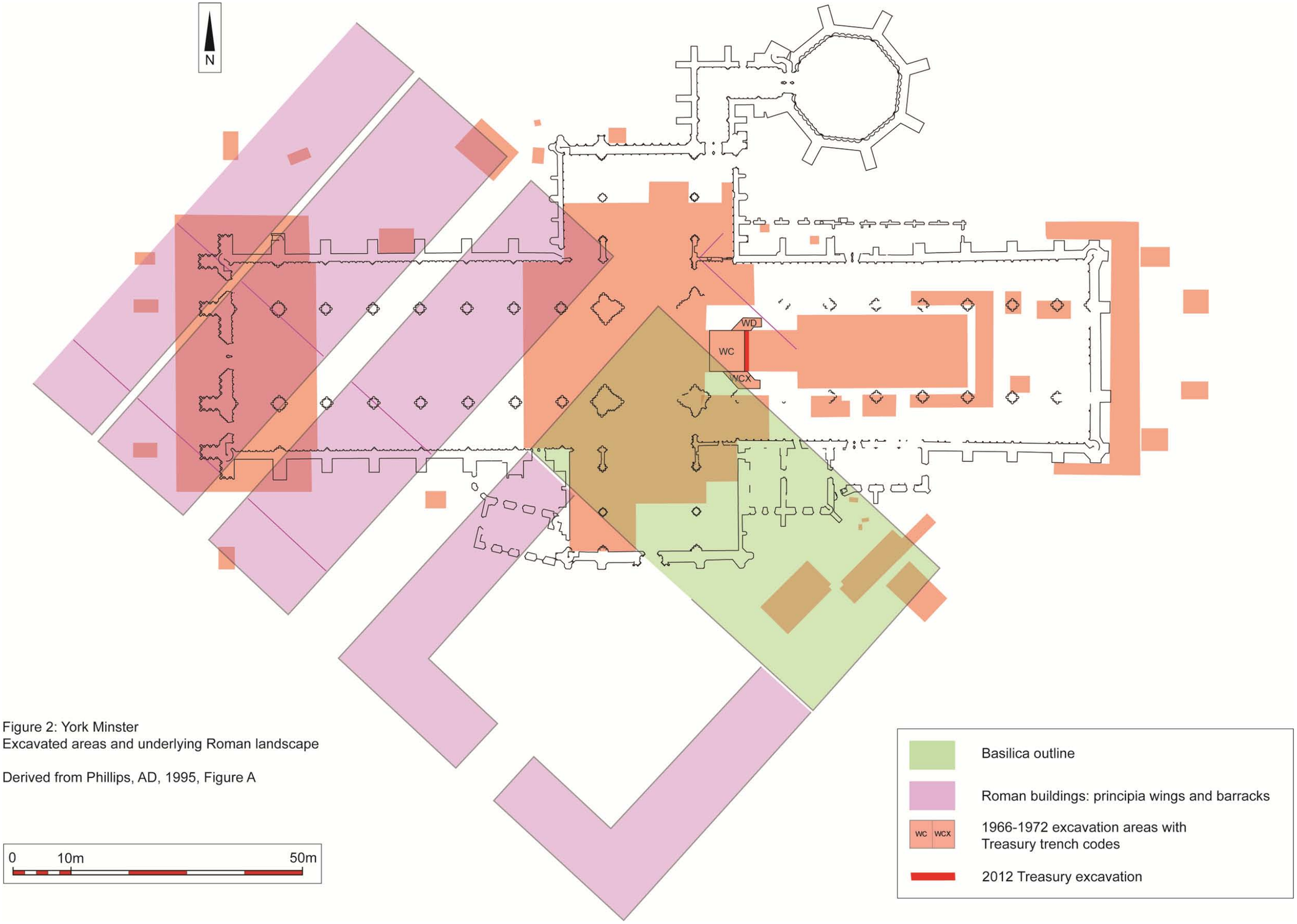


Figure 2: York Minster
Excavated areas and underlying Roman landscape

Derived from Phillips, AD, 1995, Figure A

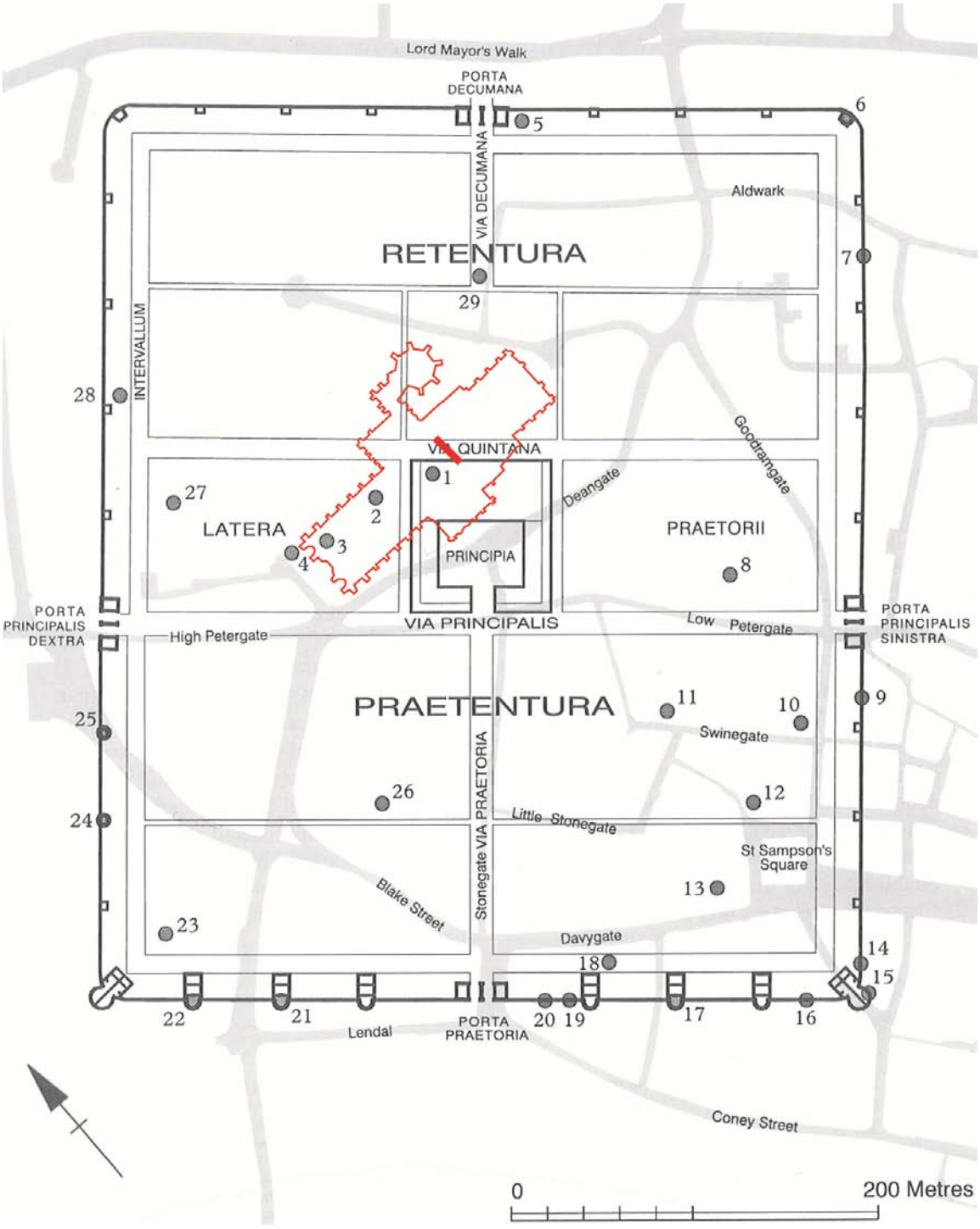


*Figure 3 Probable layout of the developed fortress, with Minster outline and excavated area (after Ottaway, 2004, 32)*

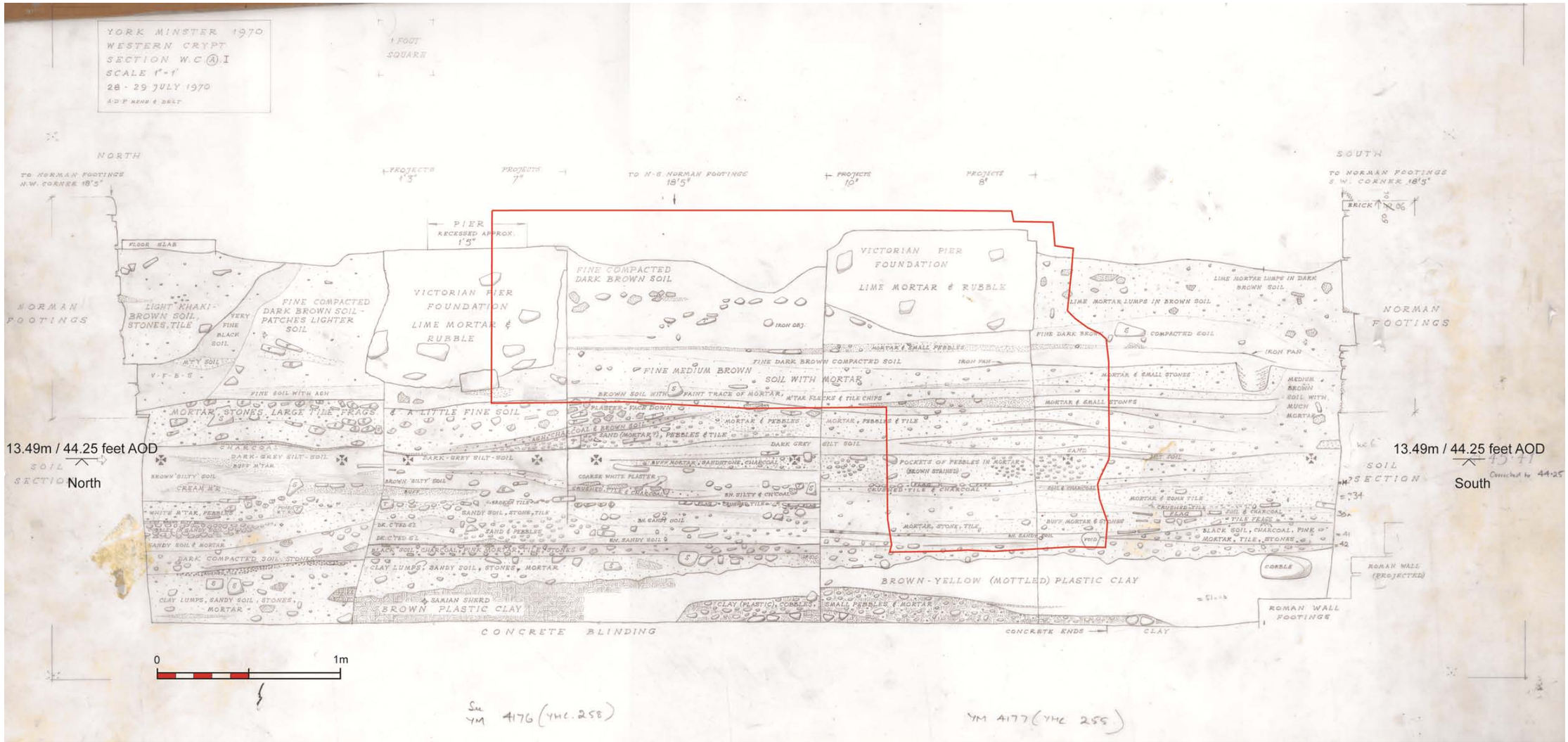


*Figure 4 Section WC1A (Derek Phillips, 28-28 July 1970) with 2012 section outline*

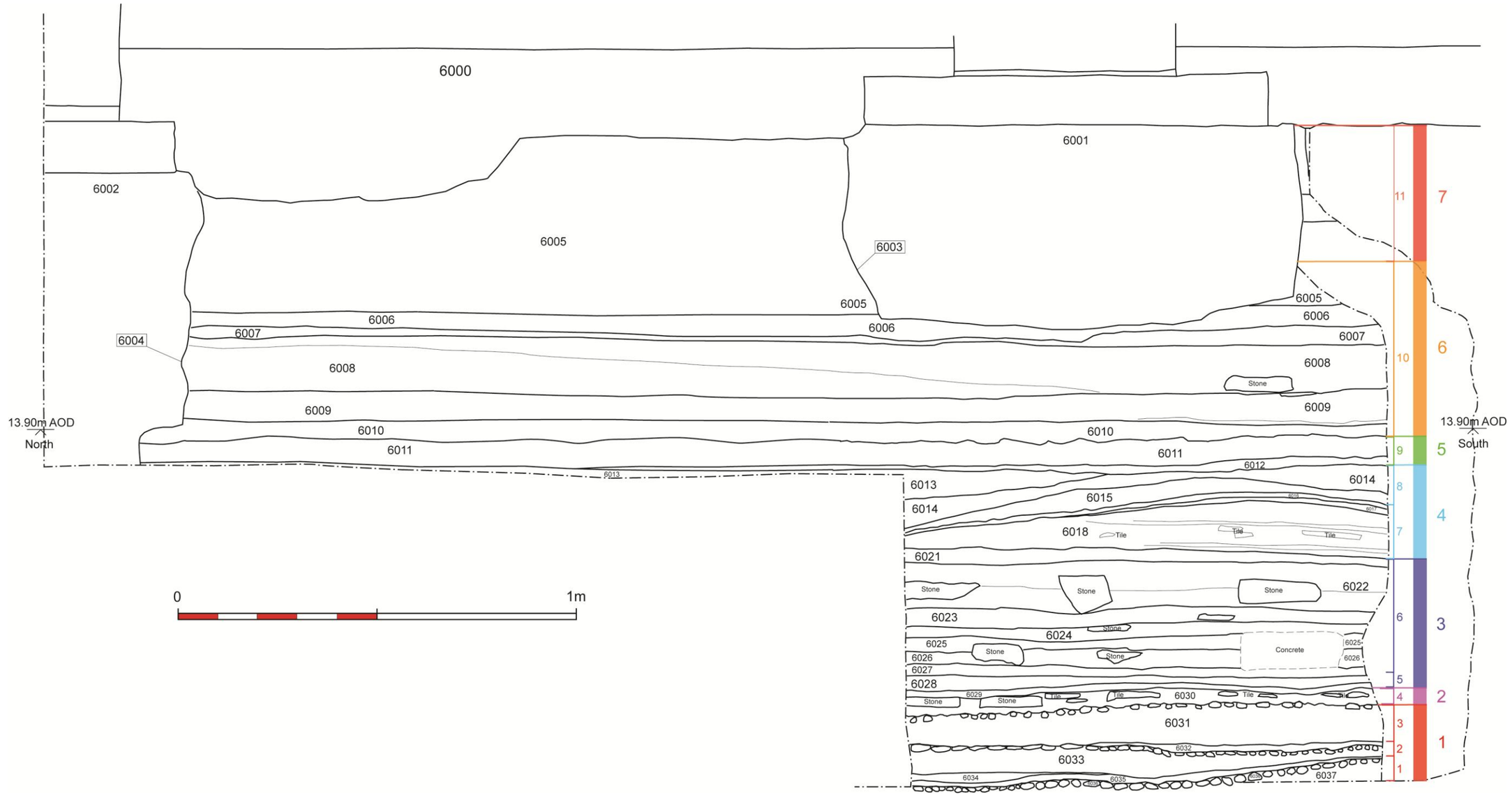


*Figure 5 West facing section, recorded 21st December 2012. Group and phase numbers in the coloured bar*

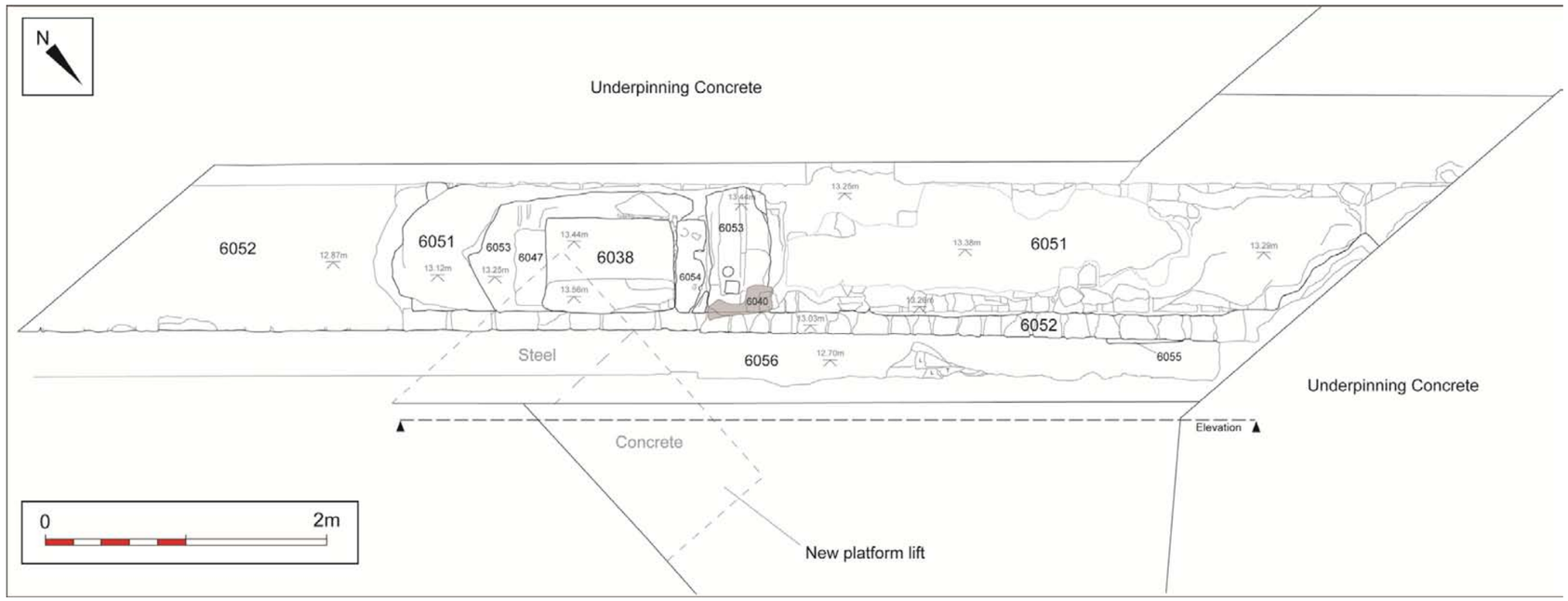


*Figure 6 Plan of basilica wall*

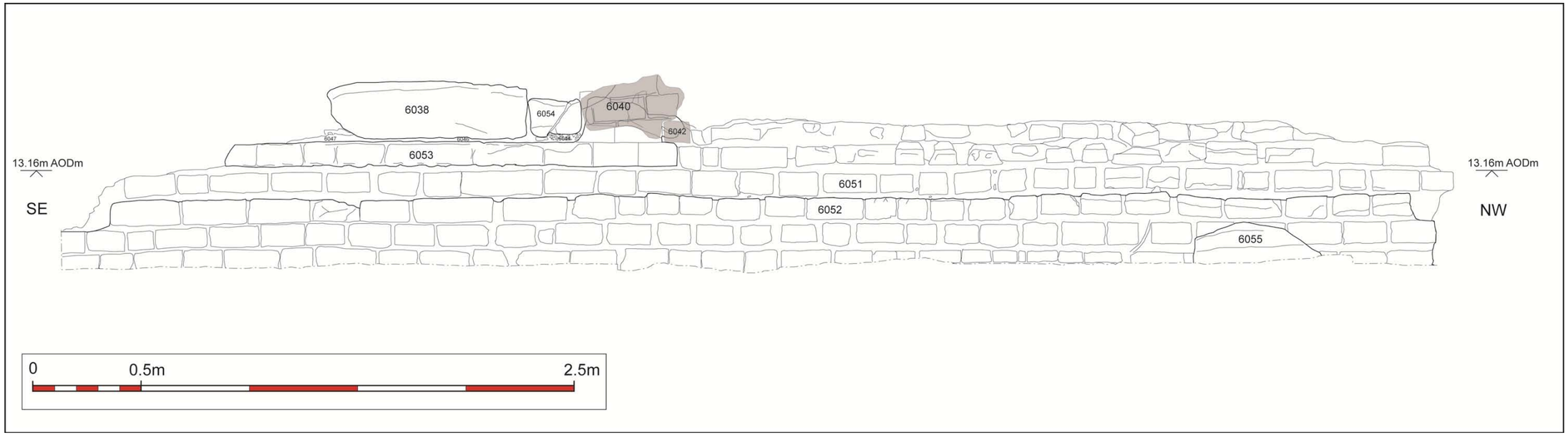


*Figure 7 NE facing elevation of basilica wall*

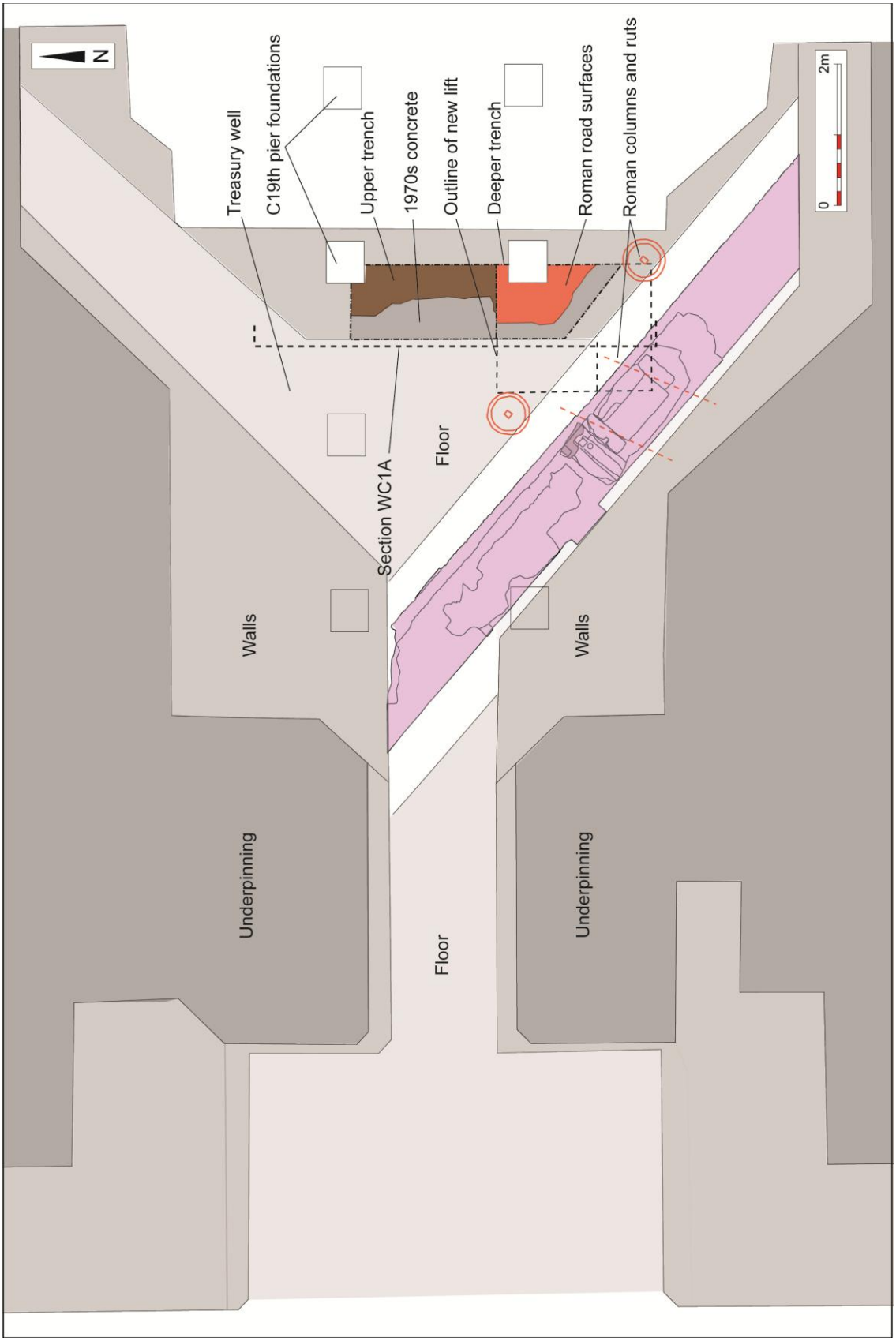


*Figure 8 Detailed 2012 trench location, showing Roman features recorded in 1970*

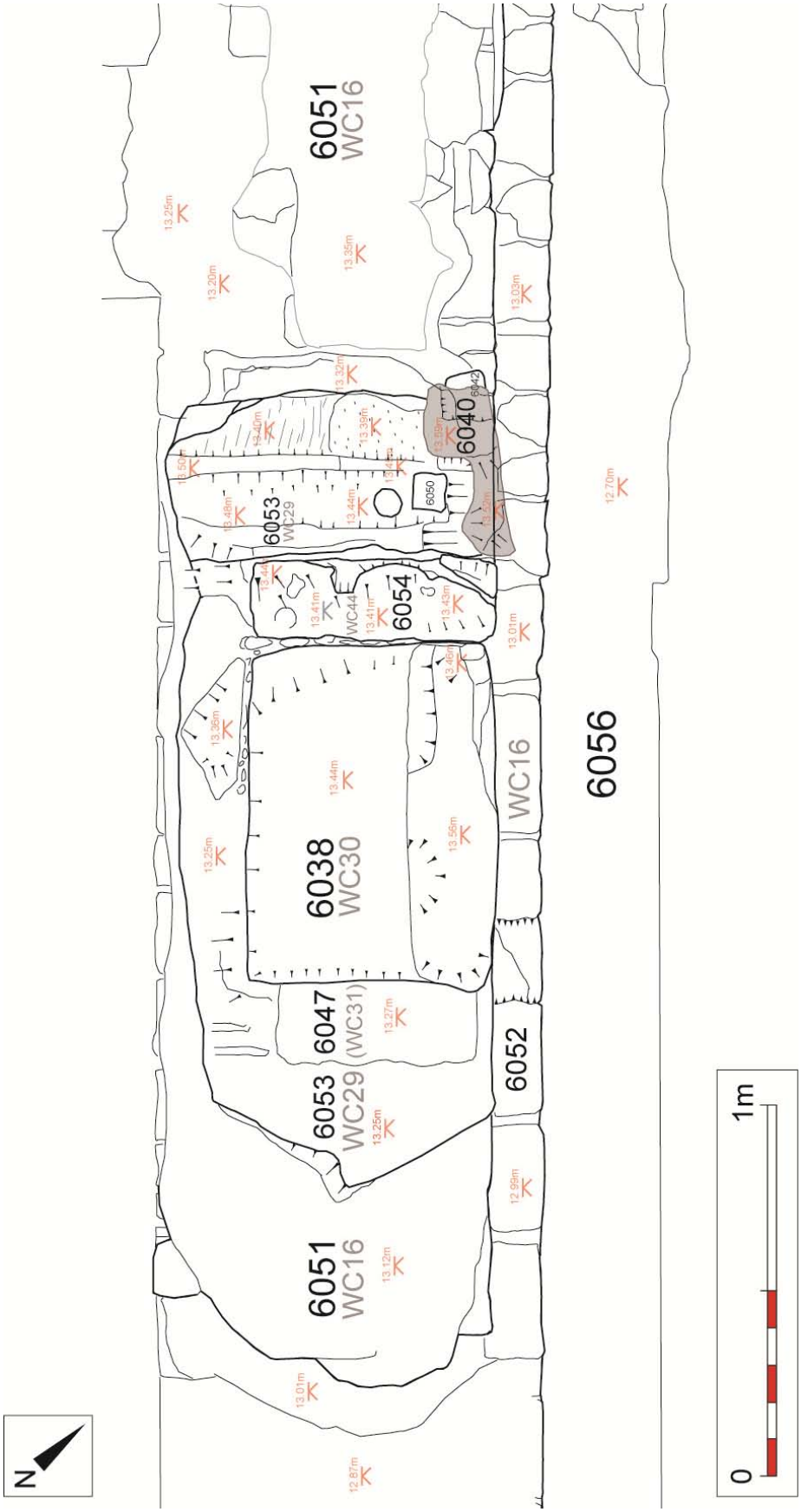


*Figure 9 Detail of basilica threshold, showing 1970s numbers in grey*

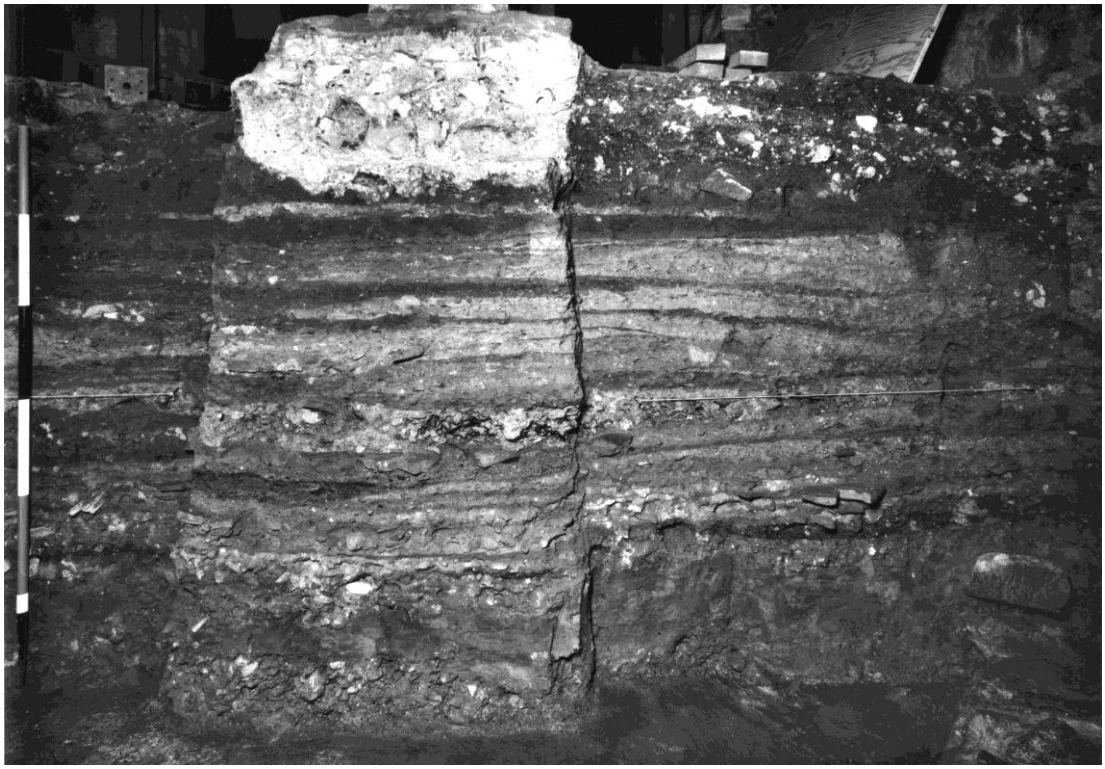

*Plate 1 Section WCA1 southern end, 29th July 1972, looking east. Image YM1477, archive*

*Plate 2 Section WCA1 southern end in colour, looking east. Image YMC255, archive*

*Plate 3 2012 excavation, west-facing section, northern end*

*Plate 4 2012 excavation, west facing section, southern end*

*Plate 5 Phase 1 road surface 6036. South to top of image.*

*Plate 6 Road surface WC42, looking SW with threshold behind. Image YM3114, archive*

*Plate 7 Phase 1 surface 6036/WC42, looking NE*

*Plate 8 Phase 1 repair 6033, looking NE*

*Plate 9 Phase 1 road surface 6031, looking east*

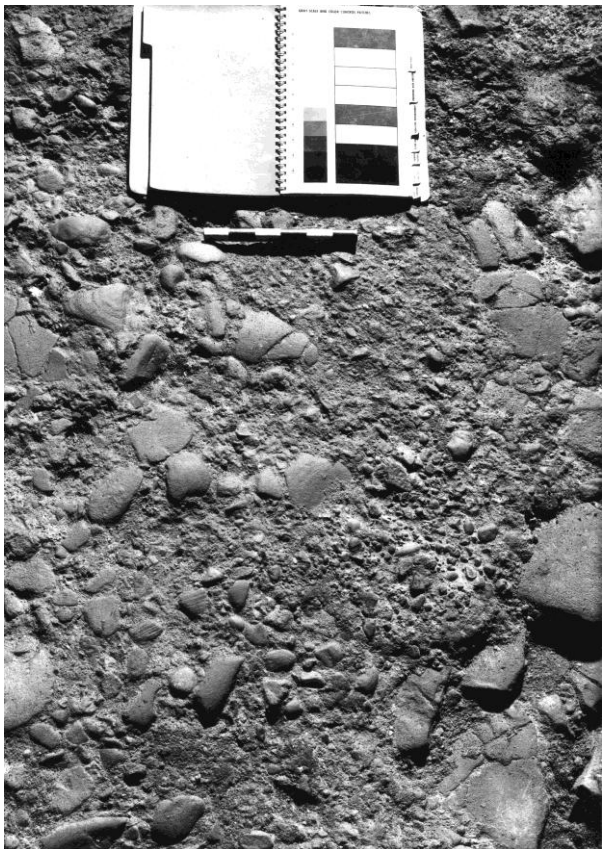

*Plate 10 Surface WC39a, looking north. Image YM3105, archive*

*Plate 11 Phase 2 levelling 6030, looking NE*

*Plate 12 Deposit WC39b, looking south. Image YM4275, archive*

*Plate 13 Surface WC19 in foreground with re-used column and surface WC39a/b, looking NE. Image YM3096, archive*

*Plate 14 Road surfaces WC42, 39a/b and possibly 19, looking SE. Image YM3101, archive*

*Plate 15 Phase 3 sub-floor deposit 6027, looking east*

*Plate 16 Phase 3 sub-floor deposit 6021 with base of erosion scar 6020, looking east*

*Plate 17 Phase 4 surface 6016 with erosion scar 6020, looking east*

*Plate 18 Phase 4 surface 6014, looking east*


*Plate 19 Phase 5 demolition spread 6013, looking east*

*Plate 20 Demolition spread 6013, looking north*

*Plate 21 Phase 6 C15th construction spread 6007, west to top*

*Plate 22 Spread 6007, looking SE*

*Plate 23 Phase 7 Southern C19th crypt pier foundation 6001, looking east*

*Plate 24 Northern C19th crypt pier foundation 6002, looking ENE*

*Plate 25 Basilica wall WC16 in 1972, looking SE (Phillips, 1995, 37 plate 3)*

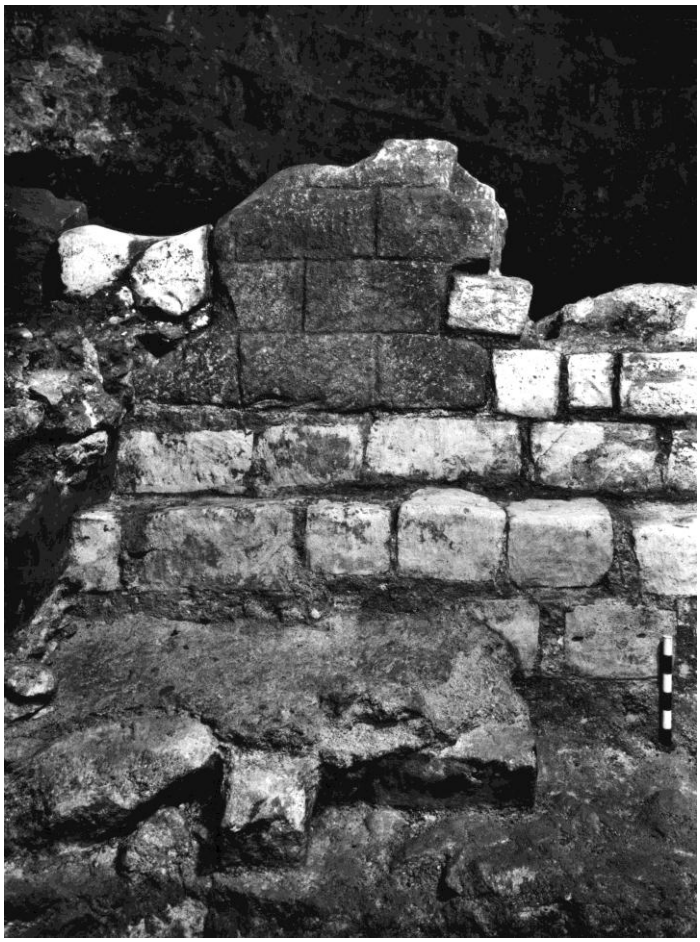

*Plate 26 Block WC29 in 1972, looking SW. Image YM4277, archive*

*Plate 27 Basilica wall in 2012, east facing elevation. Note fracture of block WC29, numbered 6053 (base) and 6040 (top section) in 2012, in comparison with Plate 26*

*Plate 28 Basilica wall in 2012, looking west, prior to removal of stones 6038/WC30 & 6040*

*Plate 29 Basilica wall, looking SE, prior to removal of stone 6038/WC30 & 6040*

*Plate 30 Basilica wall, looking SE, after removal of stone 6038/WC30 & 6040*

*Plate 31 Basilica wall, looking NNW, after removal of stone 6038/WC30 & 6040*

*Plate 32 Block 6053/WC29 after removal of fragment 6040, looking west.*

# APPENDIX 2: POTTERY BY R.S. LEARY

The pottery groups were examined in context groups and catalogued according to the Guidelines of the Study Group for Romano-British Pottery for basic archiving (Darling 2004). The sherds were recorded in broad ware and form groups based on Monaghan's classification (1997) with additional references added as appropriate.

## 1.0 QUANTITY AND PROVENANCE

There were 60 sherds of Roman pottery. The quantities of pottery sherds recovered from the excavated areas are shown in Table. 1.

| Context | B | B12 | B12 BROWN | B12? | B16 | C | C1 | C3 | C30? | G | K | O | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6000 | | | | 1 | | | | | | | | | 1 |
| 6005 | | 5 | | 1 | | | | | | | | | 6 |
| 6006 | | 1 | | 1 | | | | | 2 | | 1 | | 5 |
| 6008 | | | | | 1 | | | | | | 3 | | 4 |
| 6009 | | 13 | | | | | | | | | | | 13 |
| 6010 | 6 | 9 | | | | 1 | | 1 | | 2 | 2 | | 21 |
| 6011 | | 1 | 1 | | 1 | | | | | 1 | | | 4 |
| 6023 | | | | | | | | | 1 | | | | 1 |
| 6025 | 1 | | | | | | | | | | | | 1 |
| 6029 | 1 | | | | | | | | | | | | 1 |
| 6035 | | | | | | | 2 | | | | | 1 | 3 |
| **Total** | **8** | **29** | **1** | **3** | **2** | **1** | **2** | **1** | **3** | **3** | **6** | **1** | **60** |

*Table 1 Quantity of wares by context*

## 2.0 RANGE AND VARIETY OF MATERIAL

### 2.1 WARES AND FORMS

The fabric of the pottery was first examined by eye and sorted into ware groups on the basis of colour, hardness, feel, fracture, inclusions and manufacturing technique. If the sherds could not be adequately grouped by eye then they were examined under an x30 binocular microscope and compared with sherds from known sources. The existing York fabric and form type series codes were used (Monaghan 1997).

| WARE | COMMON NAME | SHERD COUNT |
|---|---|---|
| B | Burnished grey wares | 8 |
| B12 | Crambeck grey wares | 29 |
| B12 BROWN | Crambeck grey wares | 1 |
| B12? | Crambeck grey wares? | 3 |
| B16 | East Yorkshire grey wares- Holme-on-Spalding Moor | 2 |
| C | Colour-coated ware | 1 |
| C1 | Nene Valley colour-coated ware (white core) | 2 |
| C3 | Nene Valley colour-coated ware (oxidised core) | 1 |
| C30? | Metallic black slip ware | 3 |
| G | Grey ware | 3 |
| K | Calcite-gritted ware | 6 |
| O | Oxidised ware | 1 |
| **Grand Total** | | **60** |

*Table 2 Wares present by sherd count*

Sherds from narrow-mouthed jars, of the type normally lugged, were common and found in Crambeck grey ware. Some bodysherds may have come from similar grey ware jars in fabrics which could not be sourced but are likely to have originated within Yorkshire. The Crambeck grey ware group also included a plain-rim dish and two flanged bowls neither of which had internal wavy line burnish, a feature of the late fourth century. Sherds and scraps from beakers included a Nene Valley rouletted beaker and scraps from a C30 black-slip beaker with rouletting. These could not be precisely dated but are likely to date from the third to fourth and late second to early third century respectively. The oxidised sherd and colour-coated sherds from 6035 were not easily identified. The oxidised sherd was rather battered with no obvious form but its fabric was not unlike Crambeck brown ware dating to the late third to fourth century. The colour-coated sherd was rather thick suggesting a bowl or dish. The reddish colour coat compared with late Nene Valley wares and although the fabric was rather finer than normal this attribution is suggested. If the sherd did indeed come from a bowl or dish this would suggest a mid or late fourth century date. Given the sherd was very small such dating must be viewed as tentative.

## 3.0 CHRONOLOGY

The assessment suggested most of the pottery dated to the late third to fourth century. The low numbers of calcite-gritted wares and lack of late types suggests a date range before the late fourth century. The sherds stratified in 6035 have been tentatively dated to the mid-fourth century but the small sherd size and undiagnostic nature of these fragments made secure dating impossible.

## 4.0 SITE CHARACTER

The group has little potential to determine aspects of site function and status since most of the pottery was residual.

| CONTEXT | SPOT DATE | TOTAL NO OF SHERDS | WARE GROUP | FORM | DATE | MONAGHAN FORM AND KEY INDICATOR PHASE | COMMENT | NO OF SHERDS |
|---|---|---|---|---|---|---|---|---|
| 6000 | L3-4 | 1 | B12? | narrow-mouthed jar sherd with acute lattice burnish | L3-4 | JL 4a-4b | Although rather pale grey the texture compares to Crambeck | 1 |
| 6005 | L3-4 | 1 | B12? | narrow-mouthed jar | L3-4 | JL 4a-4b | Although rather pale grey the texture compares to Crambeck | 1 |
| 6005 | L3-4 | 5 | B12 | narrow-mouthed jar | L3-4 | JL 4a-4b | | 4 |
| 6005 | L3-4 | | B12 | narrow-mouthed jar | L3-4 | JL 4a-4b | vertical burnish lines on girth | 1 |
| 6006 | L3-4 | 5 | C30? | Tiny scrap of cream ware with what appears to be a glaze but it has been PVAed making identification difficult. Could be a metallic slip but fabric not typical for colour-coat | L2-M3 | | | 2 |
| 6006 | | | K | small scrap calcite gritted ware | | 2b-4c | | 1 |
| 6006 | | | B12 | plain-rim dish | L3-4 | DD2 4a-4b | | 1 |
| 6006 | | | B12? | narrow-mouthed jar sherd? | L3-4 | JL 4a-4b | no grey surfaces left but does have vertical burnish line so likely to be Crambeck grey rather than a pale ware | 1 |
| 6007 | All Med* | 5 | Med | | | | | |
| 6008 | 3-e4 | 4 | K | basal and lower body sherds f HM jar with sooting inside body | | | | 3 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6008 | | | B16 | base and lower body of dark faced grey ware jar, burnished externally | 3-e4 | | | 1 |
| 6009 | L3-4 | 13 | B12 | flanged bowl | L3-4 | DF3 4a-4b | | 3 |
| 6009 | | | B12 | closed vessel, probably lugged jar | L3-4 | JL 4a-4b | | 9 |
| 6009 | | | B12 | small jar base | L3-4 | | | 1 |
| 6010 | L3-4 | 23 | B12 | bodysherds | L3-4 | | | 3 |
| 6010 | | | B12 | basal sherd | L3-4 | | | 1 |
| 6010 | | | B12 | flanged bowl rim | L3-4 | | | 1 |
| 6010 | | | G | a scrap and a basal sherd | RB | | | 2 |
| 6010 | | | tile? | fragment | | | | 1 |
| 6010 | | | B12 | bodysherds | L3-4 | | | 4 |
| 6010 | | | C3 | rouletted beaker sherd | 3+ | | | 1 |
| 6010 | | | C | scrap with greenish metallic colour coat | 3+ | | | 1 |
| 6010 | | | CBM | scrap | | | | 1 |
| 6010 | | | K | scrap | L2-4 | | | 2 |
| 6010 | | | B | bodysherds | RB | | | 6 |
| 6011 | L3-4 | 4 | B12 | bodysherd | -4 | | | 1 |
| 6011 | | | B16 | bodysherd | 3-E4 | | | 1 |
| 6011 | | | G | bodysherd with cordon | RB | | | 1 |
| 6011 | | | B12 BROWN | bodysherd, burnished | L3-4 | | | 1 |
| 6012 | | 6 | CBM? | | | | | 6 |
| 6023 | 3+ | 1 | C30? | tiny scrap with metallic CC and rouletting | L2-m3 | | | 1 |
| 6025 | 3+ | 1 | B | bodysherd from jar with burnished zone defined by groove, dark faced | 3+ | | | 1 |
| 6029 | 3+ | 1 | B | bodysherd from jar as above, dark faced | 3+ | | | 1 |
| 6035 | L3-4, opt M-L4? | 4 | CBM | scrap | | | | 1 |
| 6035 | | | O | sherd of oxidised ware, possibly Crambeck ware in a brown ware. Only one surface possibly a basal sherd. Likely to be late but not a firmly diagnostic piece | L3-4? | | | 1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6035 | | | C1 | A bodysherd and tiny scrap in fine white ware with orange coating on both surface. This is very fine for NV white colour coat but not impossible. The red colour coat is on both sides and that flatness and thickness of the sherd indicates it is most likely to be open of the late Nene Valley range of dishes and bowls in the mid-late 4th. However the sherd is small and a wider date range in the late 3rd-4th century is possible. | | | | 2 |

*Table 3 Spot dating by phase, group, set and context*

## 5.0 RECOMMENDATIONS

The stratified Roman pottery should be fully catalogued recording details of fabric, form and decoration, condition and cross-joins, quantified by sherds count, sherd weight and estimated vessel equivalent according to professional guidelines (Darling 2004). Wherever possible the fabrics and forms should be recorded using the existing type series (Monaghan 1997) with additional fabrics and forms or sub fabrics and sub forms documented as appropriate.

## 6.0 BIBLIOGRAPHY

Darling, M.J. 2004 Guidelines for the archiving of Roman pottery. *Journal of Roman Pottery Studies* Vol 11, 67-75.

Gillam, J. P., 1970, *Types of Roman Coarse Pottery Vessels in Northern Britain*, 3rd edition, Newcastle

Monaghan, J. 1997 *Roman Pottery from York*. The Archaeology of York Vol 16: The Pottery fascicule 18/8.

## 7.0 MEDIEVAL POTTERY: A.S. MAINMAN

Context 6007 produced the following sherds: 1 Ryedale, 1 reduced greenware, 2 Raeren/Langerwehe stoneware, 1 Brandsby (residual). These produced a 15$^{th}$ century spot-date for 6007 at the earliest.

## APPENDIX 3: SMALL FINDS BY N. ROGERS

This small assemblage contains 28 small finds; the majority of the finds are made of metals, and these have been assessed alongside Xrays.

### 1.0 IRON

Twenty of the small finds comprise iron objects, of which seven are nails, all coming from post Roman contexts.

Six small finds include Roman hob nails, with two finds (SF9, context 6031; SF27, Context 6035) being recovered from Roman road surface, and all the others from post-Roman deposits (SF4, Context 6010; SF8, Context 6011; SF21, Context 6005; SF22, Context 6006). Recovered in situ from the threshold associated with the basilica wall of the principia, SF17 Context 6050 is now very fragmentary, but is interpreted as an iron pivot base.
Two substantial bolts (SF5, Context 6005; SF7, Context 6009) are probably of Victorian or later date. Other iron finds are undatable and/or unidentifiable.

### 2.0 COPPER ALLOY

Three finds are made of copper alloy: (SF26, context 6010) is a small stud of unknown date, and (SFs12, 13 both Context 6035) are both too fragmentary to identify.

### 3.0 PLASTER

Two finds (SF15, Context 6010; SF16, Context 6005) are made up of very small fragments of painted plaster, which are probably too small to date precisely, but could be of Roman date.

### 4.0 WOOD

A complete turned goblet (SF18, context 6200) has been assessed by wood technologist Steve Allen who notes it is a ‘spindle turned small wooden cup cut from Acer campestre L. burr wood’ (maple), and he suggests a possible 17th-18th century date for the object. This was recovered from the Roman culvert that has been part of the Undercroft display since the early 1980s; it is not known where this came from (I Milsted).

### 5.0 SLAG/METALWORKING WASTE

It is recommended that finds of iron slag (SF10, SF28, both Context 6005), and possible non-ferrous waste (SF14, Context 6018) should be referred to an archaeometallurgist

## 6.0 CONCLUSIONS

This is a small and largely uninformative assemblage, with very little being recovered from Roman deposits, and only the hob nails being definitively of Roman date. Potentially of some interest, the possible pivot lining from the basilica wall is now very fragmentary and unfortunately no longer reconstructable.

The small and largely complete small wooden cup or goblet is an unusual find, and may merit further research to enable it to be firmly dated. Further work on the remainder of the assemblage is not required.

| FIND | CONTEXT | MATERIAL | NAME |
|---|---|---|---|
| SF1 | 6000 | Iron | Nail |
| SF2 | 6008 | Iron, Stone | Nail |
| SF3 | 6005 | Iron | Nail |
| SF4 | 6010 | Iron, Stone | Nail, Hob Nail |
| SF5 | 6005 | Iron, Slag | Bolt |
| SF6 | 6009 | Iron | Nail |
| SF7 | 6009 | Iron | Bolt |
| SF8 | 6011 | Iron | Hobnails |
| SF9 | 6031 | Iron | Hob Nail |
| SF10 | 6005 | Slag | Slag |
| SF11 | 6035 | Iron, Ceramic Building Material | Strip |
| SF12 | 6035 | Iron, Copper Alloy | Object |
| SF13 | 6035 | Copper Alloy | Fragments |
| SF14 | 6018 | Copper Alloy | Waste |
| SF15 | 6010 | Plaster | Fragments |
| SF16 | 6005 | Plaster | Fragments |
| SF17 | 6050 | Iron | Pivot Lining Fragments |
| SF18 | 6200 | Wood | Cup |
| SF19 | 6025 | Iron | Fragment |
| SF20 | 6021 | Iron | Nail |
| SF21 | 6005 | Iron | Hob Nail, Nail |
| SF22 | 6006 | Iron | Hob Nail |
| SF23 | 6023 | Iron | Nail |
| SF24 | 6023 | Iron | Ring |
| SF25 | 6010 | Iron | Nail |
| SF26 | 6010 | Copper Alloy | Stud |
| SF27 | 6035 | Iron | Hob Nails, Nails |
| SF28 | 6005 | Slag | Slag |

*Table 4 Small finds list*

## APPENDIX 4: CERAMIC BUILDING MATERIAL BY J. MCCOMISH

A total of 71.140kg of ceramic building material (CBM) and stone roof tiles was recovered from the site, all of which was of Roman date. The material is summarised in terms of context, form and date on Table 1 below, while Table 2 summarises the sherd count and volume of each form present. The material was recorded to a standard YAT methodology, and in keeping with this methodology only a representative selection of the CBM and stone tile has been retained.

| Context | Dating | Keywords |
|---|---|---|
| 6000 | 1-4th | Rbrick, Tegula, Imbrex |
| 6005 | 1-4th | Imbrex, Rbrick, Stone Roof?, Tegula |
| 6006 | 1-4th | Rbrick, Stone Roof?, Imbrex |
| 6007 | 1-4th | Imbrex, Rbrick |
| 6008 | 1-4th | Imbrex, Rbrick, Stone Roof?, Tegula |
| 6009 | 1-4th | Imbrex, Rbrick, Stone Roof?, Tegula |
| 6010 | 1-4th | Imbrex, Rbrick, Stone roof?, Tegula |
| 6012 | 1-4th | Tegula |
| 6013 | 1-4th | Imbrex, Rbrick, tegula |
| 6014 | 1-4th | Imbrex, Rbrick, Tegula |
| 6015 | 1-4th | Rbrick |
| 6016 | 1-4th | Imbrex, Rbrick |
| 6017 | 1-4th | Rbrick |
| 6018 | 1-4th | Imbrex, Rbrick, Stone roof?, Tegula |
| 6019 | 1-4th | Imbrex, Rbrick |
| 6021 | 1-4th | Rbrick, Stone Roof?, Tegula |
| 6022 | 1-4th | Imbrex, Rbrick, tegula |
| 6023 | 1-4th | Imbrex, Rbrick |
| 6024 | 1-4th | Imbrex, Rbrick |
| 6025 | 1-4th | Imbrex |
| 6027 | 1-4th | Rbrick |
| 6028 | 1-4th | Imbrex, Rbrick, Stone roof? |
| 6029 | 1-4th | Imbrex, Stone roof? |
| 6030 | 1-4th | Imbrex, Rbrick, Stone Roof, Stone Roof?, Tegula |
| 6031 | 1-4th | Imbrex, Rbrick, Stone Roof, Stone Roof? |
| 6033 | 1-4th | Rbrick |
| 6034 | 1-4th | Rbrick, Tegula |
| 6035 | 1-4th | Rbrick, Rbrick? |
| 6037 | 1-4th | Rbrick |

*Table 5 Summary of CBM data by context.*

| FORM | NO. OF SHERDS | WEIGHT IN GRAMS | WEIGHT AS % OF TOTAL |
|---|---|---|---|
| Imbrex | 107 | 15375 | 22 |
| Rbrick | 184 | 26615 | 37 |
| Stone roof | 3 | 5700 | 8 |
| Stone roof? | 41 | 17885 | 25 |
| Tegula | 23 | 5565 | 8 |

*Table 6 Summary of material by form.*

## 1.0 ROMAN CBM

The Roman CBM accounted for 67% of the material examined. Only two identifiable forms of Roman CBM were present, both of which were roofing tiles (imbrices and tegulae). The majority of the sherds were too fragmented to determine the original form and these have been classed as 'Rbrick' (an abbreviation of Roman brick). The material was badly fragmented, as a result of which no length or breadth measurements survived, and in many cases even the original thicknesses of the sherds were not preserved.

There were 107 sherds of imbrex which ranged in thickness from 12-30mm, which is within the range previously recorded for York (McComish 2012, 173). The average thickness of the imbrices was18.9mm, which is marginally thicker to the 18.9mm previously recorded for York as a whole, but matches that seen in the fortress (McComish 2012, 102, 173). The only features present relating to manufacture were that two of the sherds had smoothing lines parallel to the long side of the imbrex, and a further two had smoothing lines parallel to, and adjacent to the curving end of the tile.

There were 23 sherds of tegula which ranged from 19-32mm in thickness, well within the range previously recorded for York (McComish 2012, 222). The tegulae had an average thickness of 26.5mm, which is close to that seen elsewhere in York on tegulae with type B6 lower cutaways (McComish 2012, 222). The flange heights ranged from 48-64mm (but only three examples were present), which is again within the range previously recorded for York (McComish 2012, 222). Two of the tegulae had type B6 lower cutaways, as defined by Warry (2006, 5), which are the commonest type seen in York (McComish 2012, 231). Two sherds had pronounced finger grooves adjacent to the flange, caused by running the hands over the flange to smooth it, and this is a common feature of tegulae.

The ratio of tegulae to imbrex is of interest; in York as a whole there is 1.78g of tegula to every 1g of imbrex (McComish 2012, 169, 218), but on this site there is 2.7g of imbrex to every gram of tegula. Clearly there are far more imbrices on this site than is the norm for

York a as whole. One possibility is that there was a stone roof with a ridge line of imbrices at some stage, thereby increasing the proportion of imbrices seen.

The remaining sherds were too badly fragmented to determine the original form. The only features of interest on this material were a partial hob nail boot impression on one sherd and an overfired sherd. Hob-nail boot impressions are more common on military produced tiles than on civilian produced tiles, and it has been suggested that this may reflect the officer in charge testing the hardness of tiles to determine if they were ready for firing (Warry 6006, 16). The location of a hob-nail boot impression within the fortress is therefore to be expected. Four small sherds from Context 6035 (which collectively weighed 30g) seemed to be in a Roman fabric, and were from a Roman context, but had clear glaze on the broken surfaces. Glaze is not normally associated with Roman ceramics, so it is possible that these sherds represent later intrusive material.

Five fabrics were identified among the sherds (Table 3). In addition, there was a single sherd which was too small to identify the fabric (classified as R0). Comparing the proportion of fabrics present to that seen for York as a whole (McComish 2012, 288) shows that there is far less R9 and far more R11 on this site than in York as a whole. While both these fabrics are present throughout the Roman period, there is some suggestion that R9 is the earlier of the two fabrics (McComish 2012, 319), which may suggest that the tiles on the site were predominantly from the period post-dating AD 120.

| FABRIC | WEIGHT IN GRAMS | WEIGHT AS % OF TOTAL | WEIGHT AS A % OF ROMAN TILE IN YORK AS A WHOLE |
|---|---|---|---|
| R0 | 10 | 0.01 | 5.49 |
| R2 | 475 | 0.67 | 3.87 |
| R3 | 3875 | 5.45 | 6.90 |
| R9 | 6405 | 9.00 | 24.27 |
| R10 | 4025 | 5.66 | 24.71 |
| R11 | 32765 | 46.06 | 12.49 |

*Table 7 Summary of Roman CBM by fabric*

## 2.0 ROMAN STONE TILES

There were 3 fragments of micaceous sandstone roof tile present, two of these were in Context 6030 and one was in Context 6031. These three tiles ranged from 19-24mm in thickness. The first of these fragments (from Context 6030) had a nail hole 10mm in diameter, but there were no surviving edges to give any indication as to the original shape of

the tile. The second fragment (from Context 6031) had two surviving edges at an angle of 115° to one another. This angle is very similar to that seen on a number of complete stone roof tiles, shaped like an elongated hexagon, which were recovered from a site at Heslington East, 3km south-east of York, which are the best collection of stone tiles form the York area (McComish 2013, 26-7). This suggests that some of the tiles found at the Minster were of a hexagonal shape. The third fragment (from Context 6030) was in excess of 445x304mm in area, with two original edges which were at an angle of 98° to one another, indicating that the tile was polygonal originally. The precise shape of this fragment in its original form is unclear; the angle of the sides is clearly very different to that seen on the Heslington East tiles, and the fragment is also far larger than any of the complete examples seen at Heslington East (McComish 2013, 25).

There were an additional 42 fragments of micaceous sandstone which probably originated from stone roof tiles, and these ranged from 11-34mm in thickness. Four of these were heat scorched on one surface (one from Context 6030 and three from Context 6031). Although mica was clearly present in all of the stone tile fragments, it should be noted that in many cases the mica content was very low.

Phillips and Heywood (1995, 40) suggested that the *principia* building was roofed with ceramic tiles throughout the Roman period, but the proportion of stone roof tiles on the current excavation casts doubt on this interpretation, suggesting that a stone roof was present in the vicinity at some stage.

## 3.0 ARCHITECTURAL FRAGMENTS

Only one architectural fragment was recovered from the excavations. I was recovered from Context 6006, which has been phased as Norman (I. Milsted pers. comm.). Although this block was insufficiently diagnostic to be closely dateable, the degree of erosion may suggest that it represent re-used Roman material. The fragment was too eroded to merit retention.

ARCHITECTURAL FRAGMENT 1 CATALOGUE ENTRY

Worked block of magnesian limestone, 154 x 140 x 73mm in size, with four original faces present (F1-F4). Roughly triangular in plan and rectangular in cross-section. F1 = base, F2 = side (originally concealed within the thickness of the wall), F3 = upper surface, F4 = original exterior surface with a severely eroded chamfer on the upper arris. No tooling present.

## 4.0 SUMMARY AND RECOMMENDATIONS

The material seen was highly fragmented and as such, very little was worthy of retention. While none of the material seen is unusual in itself, being typical for York as a whole in terms of the forms, fabrics and dimensions seen, the proportion of imbrices, tegulae and stone tiles present is unusual, and is suggestive of a stone roof having been located nearby. While the collection is too small to merit any further research in its own right, it does add to the overall picture of the development of the *principia*, and as such would need including in any future publications relating to the Roman remains beneath York Minster.

## 5.0 REFERENCES

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# APPENDIX 5: ANIMAL BONE BY C. RAINSFORD

## 1.0 HAND-COLLECTED BONE

The faunal remains from the Undercroft Treasury, York Minster, were assessed with a view to providing a preliminary characterisation of the species composition and preservation condition of faunal material from the various phases, and also to expand on patterns noted from previous assessment of faunal material from the South Transept Lift Shaft excavations (Rainsford 2012). 251 fragments were recovered from 20 contexts at the site, which provides a well-stratified sequence from Roman use of the site to the construction of the 11th century cathedral. The assemblage was assessed in full.

### 1.1 METHODS

All material was identified to the lowest taxonomic level possible, and identifications were confirmed by comparison to reference specimens from the Department of Archaeology, University of York. Where identification to taxon was not possible (eg. for ribs, vertebrae, and shaft or cranial fragments without identifiable features), fragments were counted as unidentified. Elements were recorded as “sheep” unless positively identified as “goat”, owing to the difficulty of distinguishing between these two taxa, and the relative lack of goat elements in material from York. Basic age data (adult / sub-adult / juvenile) and level of fragmentation (completeness relative to whole bone) was recorded for each identifiable bone, and any further taphonomic information was recorded by means of notes for each context. Bone was defined as “adult” if fully-fused or teeth with wear; “sub-adult” if unfused; and “juvenile” if showing a poorly-mineralised bone texture and / or clearly juvenile size.

For each context, the overall assemblage condition was recorded using a qualitative scale (very good / good / reasonable / poor / variable), and the overall fragmentation was also recorded (“mostly complete” (A), “moderately fragmented” (B) or “highly fragmented” (C)). Brief taphonomic descriptions, including colouration and weathering, were also made for each context.

Bone was kept bagged by context following analysis. Data were stored as Excel spreadsheets. NISP (Number of Identified Specimens) has been used as a descriptive quantification method throughout. The assistance of Terry O’Connor in identification of bird bone and other problematic elements is gratefully acknowledged.

### 1.2 RESULTS

In total, 251 fragments were recovered from 20 contexts at the Undercroft Treasury site. 65 fragments (c.26% of assemblage) were considered identifiable to taxon level. Over two-thirds

of the assemblage derived from Phase 6 (11th century cathedral construction, 73%), with smaller assemblages recovered from phases 3, 4 and 5 (c. 20 fragments each) and only 5 fragments in total recovered from Roman contexts (phases 1 & 2) (Table 1). Very little evidence, therefore, is present for the pre-medieval period from this site.

## 1.3 SPECIES DISTRIBUTION

Species diversity is relatively restricted, with the major domesticates (cow, sheep, pig) making up the vast majority (c.85%) of the identified material from the site (Table 2). Domestic bird species (chicken and goose) make up a further 9% of the assemblage. Dog and small duck are the only remaining taxa represented in the assemblage, each represented by a single element.

Little variation is apparent in species prevalence over time at the site. Cow elements are most prevalent throughout the sequence, making up 35% of total identified assemblage. Pig and sheep elements occurred with similar frequency, although pig was slightly more common overall (29% of assemblage, compared to 21% for sheep). This is a typical pattern for York assemblages, where cow tends to predominate, and sheep increases in frequency to become the second most prevalent species from the 12th century onwards (Bond & O'Connor 1999; see also Rainsford 2012). This also corroborates patterns noted from the South Transept Lift Shaft excavations (Rainsford 2012).

Juvenile and sub-adult elements were present from all major domesticates from the site (Table 3). The majority of cattle elements for which age could be attributed were fully adult (80%). However, both sub-adult and juvenile elements were recorded from phases 5 & 6 at the site. In addition, one cow pelvis with significant age-related pathology (eburnation on articular surfaces of acetabulum) was present in phase 6, indicating the consumption of older animals, possibly used previously for traction. 50% of sheep elements for which age could be attributed were recorded as sub-adult, and all sub-adult elements of sheep also derive from phase 6. This is in contrast to material from the South Transept Lift Shaft, where only a small minority of sheep elements were considered sub-adult or juvenile, and it is therefore likely that the apparently-high proportion of sub-adult sheep in the Undercroft Treasury is due to sampling bias.

In contrast, the proportion of adult pig is higher in the Undercroft Treasury than was recorded for the South Transept site (47% compared to 22%). Very few juvenile pig elements were recovered, and these all derived from phase 6 (11th century cathedral construction). In other excavations from York Minster, including the South Transept Lift Shaft, a significant proportion of young pig elements have been recovered, particularly from post-Roman /

Anglian contexts, which has been argued either as representing pig husbandry or consumption of suckling pig in the former Basilica area (Rackham 1995, Gerrard 2007; see also Rainsford 2012). The absence of juvenile pig from earlier contexts in the present case, however, is likely a result of small sample size rather than any genuine patterning – 1 ageable pig element was recovered from post-Roman / Anglian phases (3 & 4), and this was recorded as sub-adult. The presence of juvenile elements of pig in the 11th century (phase 6) corresponds to increases in the frequency of sub-adult cattle and sheep at the Undercroft Treasury site, and could indicate more diverse refuse with a status component. However, since phase 6 also represents the majority of bone from the site, the pattern may equally be accounted for by sampling biases.

The most prevalent bird taxon represented is chicken, with only one element of domestic goose present in phase 5. One element of a small duck (*Anas sp.*) was recovered from phase 6. This is the only wild species recovered from the Undercroft Treasury site, and corroborates the pattern of a more diverse assemblage, with a potential high-status component, in the 11th century at the site. A variety of contributing sources was suggested for the South Transept assemblage (Rainsford 2012), and this may be reflected in the smaller assemblage from this site.

A number of fragments of fish were also recovered from phase 3 (post-Roman), including a number of scales. Elements of fish were present in samples from the South Transept Lift Shaft at this period, although fish tend to be more common later in the medieval period at the site.

## 1.4 TAPHONOMY

Subjective assessment was made of the condition of the material from York Minster, in addition to a more thorough recording of specific taphonomic features affecting individual elements. The condition of the material was primarily recorded as “good” or “reasonable”, with overall fragmentation recorded primarily as “B – moderately fragmented” (Table 1). There was a certain amount of variability in taphonomic pathways noted, with staining recorded either as “mid-brown” or “fawn”, and contexts described as containing material in “fresh”, “good” or “battered” condition, where “battered” may indicate either taphonomic (weathering) or diagenetic damage to surfaces and edges. Notably, staining and condition varied between contexts in a phase as much as between phases, potentially indicating a range of different preservation conditions and taphonomic pathways within each phase. Only one context, [6005] in phase 6, showed evidence of root etching on a number of elements, indicating burial of material in an active soil zone at some stage.

Evidence for butchery was present on a number of elements throughout the assemblage. Most notably, the dog pelvis recovered from phase 4 showed a series of parallel knife cuts towards the base of the ilium. This is consistent with either skinning or butchery for consumption. While use of dogs for skins or food is not thought to have been uncommon in medieval urban centres, despite general avoidance of dog meat in western Europe, it is relatively rare to find direct evidence for these practices.

| PHASE | DESCRIPTION | NUMBER OF FRAGS | CONTEXTS WITH BONE | ID | UNID MAMMAL | UNID BIRD | UNID FISH | FRAGMENTATION | CONDITION |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Roman road use and repair | 5 | 2 | 1 | 4 | | | B | good / reasonable |
| 2 | Collapse of basilica | | | | | | | | |
| 3 | Post-Roman ?paved surfaces | 20 | 6 | 3 | 5 | | 12 | B / C | good / reasonable / variable |
| 4 | ?Anglian / Anglo-Scan unpaved surfaces | 18 | 4 | 4 | 13 | 1 | | B / C | good / reasonable |
| 5 | Landscaping - late Anglo-Scan / early Norman | 25 | 2 | 9 | 16 | | | B | reasonable |
| 6 | C11 cathedral construction | 183 | 6 | 48 | 131 | 4 | | mostly B | reasonable |
| 7 | C19 crypt construction | | | | | | | | |
| **TOTAL** | | **251** | **20** | **65** | **169** | **5** | **12** | | |

*Table 8 Quantity of animal bone by phase from the Undercroft Treasury site, York Minster*

| PHASE | 1 | 3 | 4 | 5 | 6 | TOTAL |
|---|---|---|---|---|---|---|
| cow | 1 | 1 | 1 | 6 | 15 | 24 |
| sheep | | | 1 | | 13 | 14 |
| pig | | 1 | | 2 | 14 | 20 |
| dog | | | 1 | | | 1 |
| goose | | | | 1 | | 1 |
| chicken | | 1 | 1 | | 3 | 5 |
| small duck | | | | | 1 | 1 |
| **Total** | 1 | 3 | 4 | 9 | 48 | 68 |

*Table 9 Species representation by phase. All frequencies given are NISP.*

| | ADULT | | SUB-ADULT | | JUVENILE | | TOTAL |
|---|---|---|---|---|---|---|---|
| | Q | % | Q | % | Q | % | |
| Cattle | 12 | 80.0 | 2 | 13.3 | 1 | 6.7 | 15 |
| Sheep | 4 | 50.0 | 4 | 50.0 | | | 8 |
| Pig | 7 | 46.7 | 4 | 26.7 | 4 | 26.7 | 15 |

*Table 10 Age distributions of domestic mammals. All frequencies given are NISP. "Total" refers to total age-attributable elements, and all percentages are given relative to this total.*

## 2.0 BONE RECOVERED FROM SAMPLES

The faunal bone recovered from samples taken from the Undercroft Treasury was assessed with a view to providing a preliminary characterisation of species composition, and the extent to which this corresponds to sampled material from the South Transept Lift Shaft excavations (Rainsford 2012). Hand-collected material from the Undercroft Treasury excavations was assessed and reported separately (see Part I of this report). While material from samples is more inclined to reflect spatial biases, representing material recovered from a restricted area of site, it is not subject to the same well-rehearsed biases as material recovered by hand-collection. In particular, methods of flotation or sieving through a fine mesh (5mm or less) are able to recover consistently bones of smaller-bodied mammals, birds, fish and amphibians. The presence of these taxa in samples can be significant in assessing past ecology or consumption practices at the site.

An assemblage of c.2000 fragments was recovered from 19 samples, taken from 10 contexts from the Undercroft Treasury excavations. 10 samples were recovered by sieving, and 9 were recovered through flotation methods. The assemblage was assessed in full.

### 2.1 METHODS

The majority of material was identified to the lowest taxonomic level possible, and identifications were confirmed by comparison to reference specimens from the Department of Archaeology, University of York. However, due to time constraints, a number of taxa were identified only to genus or family level. No distinction is made between wood mouse and house mouse species (*Apodemus sp.* & *Mus sp.*). Material from the South Transept Lift Shaft appeared to indicate a predominance of *Apodemus sp.*, and it is probable that the Undercroft Treasury material is consistent with this. Of the shrew species, only common shrew (*Sorex araneus*) was positively identified. Bird species identified as "small passerines" (blackbird / thrush and smaller) are generally not identified to species level, as the order is highly speciated and the effort required to distinguish the morphologically-similar species was not considered worth the information which this would yield. Further work is clearly possible to

fully identify the small mammal species and passerines to the lowest possible taxonomic level, but was considered to add little present research value for the time required.

Basic age data (adult / sub-adult / juvenile) was recorded for each identifiable bone. Bone was defined as “adult” if fully-fused or teeth with wear; “sub-adult” if unfused; and “juvenile” if showing a poorly-mineralised bone texture and / or clearly juvenile size. Taphonomic information was recorded for identifiable elements and samples where this was considered significant.

Bone was kept bagged by sample following analysis. Data were stored as Excel spreadsheets. NISP (Number of Identified Specimens) has been used as a descriptive quantification method throughout. The assistance of Terry O’Connor in provision of lab space is gratefully acknowledged.

## 2.2 RESULTS

Approximately 2000 bone fragments were recovered overall from samples taken from the Undercroft Treasury. 1450 fragments (72%) were recovered by sieving, and the remaining 550 fragments through flotation. The use of flotation did not in this instance notably increase the taxonomic diversity of the assemblage, reflecting the fact that sieving was through a sufficiently fine mesh to effectively capture the majority of bones from small-bodied species at the site. 143 fragments were identified to some taxonomic level (excluding fish), making up approximately 8% of assemblage. This is a similar proportion to the material from the South Transept Lift Shaft. The low frequency of identified fragments indicates the very high degree of fragmentation in the assemblage, with the majority of material comprising small (<10mm) fragments of unidentifiable mammal bone.

Phases 3 (Post-Roman ?paved surfaces) and 6 (C11 cathedral construction) yielded the largest assemblages of bone from the site. This partly reflects the larger numbers of samples taken from these phases (6 for each, compared to 2 or 3 for the other phases). However, the quantity of bone is sufficiently greater in phases 3 and 6 that it cannot entirely be accounted for by sampling bias. The frequency of bone in phase 3 can partly also be attributed to the relatively high frequency of fish in these samples (see discussion below). This temporal distribution, with post-Roman and 11$^{th}$ century material well-represented, contrasts to the material recovered from the South Transept Lift Shaft, where the majority of material was Roman or Anglian in date, and very little medieval material was recovered.

## 2.3 MACROMAMMAL

Macromammal remains comprised only a very small proportion of assemblage, with only 10 fragments positively identified. These all derived from the major domesticates, with pig elements most frequent, and cattle and sheep comprising two and three elements respectively. A higher frequency of pig elements from sieved samples compared to hand-collected material was noted as well from the South Transept Lift Shaft and discussed in Rainsford (2012), although as yet there is no convincing explanation as to why this should be the case.

The majority of elements recorded were adult, although sheep and pig both included elements recorded as sub-adult. One element tentatively identified as a foetal / juvenile pig phalanx was recorded from phase 3 (post-Roman). This corresponds to evidence recorded from previous excavations which indicated the presence of young pigs in the vicinity of the Minster, particularly in 5th century contexts (Rackham 1995, Gerrard 2007, Rainsford 2012). One knife cut was recorded from a sheep tarsal. Excepting this, there was no striking evidence for any butchery on any of the bones recovered.

## 2.4 MICROMAMMALS, BIRDS AND AMPHIBIANS

In general, the taxonomic composition of the material from the Undercroft Treasury appears similar to material recovered from the South Transept. The micromammal assemblage consists of mice, voles and shrews, with black rat (*Rattus rattus)* also recorded in a few instances (discussed below). All three vole species are present, although field vole (*Microtus agrestis*) is by far the most frequent, with water vole (*Arvicola amphibius*) and bank vole (*Myodes glareolus*) each represented by one or two elements. It is notable that species diversity in the micromammals is highest in phase 6 (11th century), and is relatively low in the phases prior to this. The increase in species diversity appears to reflect an overall increase in the proportion of micromammals, rather than being an effect of larger sample size – phase 3 yielded a similar overall quantity of microfaunal bone from the same number of samples, but only 4 micromammal elements, compared to 91 from phase 6. This contrasts markedly to patterns noted from the South Transept excavations, where the diversity of microfauna appeared to decrease during the Anglian period, and no microfauna was recorded from 11th century contexts (Rainsford 2012). The Undercroft material does appear less diverse than that recovered from the South Transept, although the effect of sample size cannot here be ruled out, as the assemblage recovered from the South Transept was almost twice the size of that recovered from the Undercroft. More elements of shrew (*Sorex araneus)* were present in the Undercroft material compared to the South Transept, and these were largely concentrated in the 11th century Undercroft contexts. In the South Transept material, shrew elements continued to be present following the drop in taxonomic diversity, and this

potentially indicates an overall increase in the proportion of shrews in the area. However, it is clear that in this case sampling of different areas of the site produces a different impression of the distribution of microfauna. This may indicate genuine spatial zoning, with different microenvironments more or less conducive to supporting micromammalian populations present in different locations across the Minster complex at different times. Alternatively, it may simply reflect zoning in terms of deposits where microfaunal bones were preserved, rather than where they were alive and scurrying around.

All amphibians which could be positively identified to species level were identified as frog (*Rana temporaria)*, and these were present in small quantities throughout the assemblage. This corresponds to patterns seen from the South Transept. Few bird elements were identified, and these were predominantly consistent with chicken and goose, and concentrated in phases 1-3. Context [6023] (phase 3) was notable for containing a small collection of juvenile chicken elements, which are consistent as all belonging to one individual. This may indicate that chickens were being raised in the area in this period. It is also worth noting that context [6023] contained a substantial collection of fish bones and scales, discussed below. The only other identified bird elements consisted of two elements of small passerine, approximately sparrow-size, recovered from a single context in phase 6.

The occurrence of black rat in deposits from both the South Transept and the Undercroft are worth further mention. In both areas, black rat was recorded in post-Roman deposits, and in the Undercroft also from 11$^{th}$ century deposits. In terms of biotemporal distribution, black rat is present in Britain in the Roman period, but few records of black rat exist from 4$^{th}$ – 10$^{th}$ century deposits, indicating population decline or even local extinction across Britain in this period (Rielly 2010). While problems of residuality and intrusion always need to be taken into consideration, the material from York Minster may represent relatively late instances of black rat at the end of the Roman period, and relatively early instances following their reintroduction, which may be significant in combination with other evidence from across the city of York.

## 2.5 FISHES

The temporal distribution of fish from samples from the Undercroft Treasury is striking. Few fish elements are present throughout most of the sequence, with a slight increase in phase 6, corresponding to the increasing taxonomic diversity and larger sample size already noted for this phase. However, phase 3 (post-Roman) stands out as containing almost 90% of the entire fish assemblage recorded from the Undercroft (c.300 fragments). The majority of this assemblage was recovered from one context, [6023], described as levelling or collapse. Fish

scales were also recorded from this context in the hand-collected material (see previous section of report).

Owing to time constraints and the difficulty of the material, the fish assemblage from the Undercroft was not systematically identified to any taxonomic level beyond "fish". However, spot identifications were made of eel (*Anguilla anguilla*, phase 3) and cyprinids including elements consistent with chub (*Leuciscus cephalus*, phases 2 & 3) and barbel (*Barbus barbus*, phase 3), indicating a distinct component of freshwater fish in the assemblage. The assemblage from context [6023] appeared to encapsulate a notable amount of diversity in a relatively small identifiable fraction, although further work will be required to bear this out. Context [6023] also contained a substantial collection of fragmented fish scales, indicating excellent preservation of faunal material. Evidence of fishing in the post-Roman period is relatively rare in York, and the spatial concentration of material into a single context suggests an unusual and potentially primary deposit. Further identification of the assemblage from context [6023] is therefore recommended, preferably in combination with other fish remains from the Minster area.

| Phase | Samples taken | N | N (sample) | N (flot) | ID | %ID | Macro mammal | Micro Mammal | bird | amphib | fish |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 3 | 27 | 26 | 1 | 1 | 3.7 | 1 | | | | 1 |
| 2 | 2 | 154 | 121 | 33 | 8 | 5.2 | 3 | 1 | 2 | 2 | 1 |
| 3 | 6 | 743 | 625 | 118 | 25 | 3.4 | 3 | 8 | 11 | 3 | 303 |
| 5 | 2 | 95 | 86 | 9 | 3 | 3.2 | 1 | 2 | | | 1 |
| 6 | 6 | 1062 | 676 | 386 | 106 | 10.0 | 2 | 95 | 3 | 11 | 25 |
| **TOTAL** | **19** | **2081** | **1534** | **547** | **143** | **6.9** | **10** | **106** | **16** | **16** | **331** |

*Table 11 Faunal bone recovered from samples. N = number of fragments. Fish were not counted as identified as they were not systematically identified to species or genus level.*

| Phase | 1 | 2 | 3 | 5 | 6 | Total |
|---|---|---|---|---|---|---|
| cow | | 1 | | | 1 | 2 |
| sheep | 1 | 1 | 1 | | | 3 |
| pig | | 1 | 2 | 1 | 1 | 5 |
| mouse / cf. mouse | | | 2 | 1 | 7 | 10 |
| bank vole | | | | | 2 | 2 |
| field vole | | | | | 11 | 11 |
| water vole | | | | | 1 | 1 |
| myomorpha | | | 2 | | 49 | 51 |

| | | | | | | |
|---|---|---|---|---|---|---|
| black rat | | | 1 | | 3 | 4 |
| rat / vole | | 1 | 3 | | 1 | 5 |
| common shrew | | | | 1 | 21 | 22 |
| frog | | | | | 5 | 5 |
| amphibian | | 2 | 3 | | 6 | 11 |
| chicken / cf. chicken | | 1 | 7 | | | 8 |
| goose / cf. goose | | 1 | 1 | | | 2 |
| passerine | | | | | 2 | 2 |
| bird | | | 3 | | 1 | 4 |
| *fish* | *1* | *1* | *303* | *1* | *25* | *331* |

*Table 12 Taxon representation for material from samples. All numbers given are NISP values.*

## 3.0 REFERENCES

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# APPENDIX 6: ENVIRONMENTAL ANALYSIS BY S. CARSON & C. INNES

## 1.0 SUMMARY

Analysis of samples representing activity at York Minster spanning the lifespan of the Via Quintana to the construction of Thomas' cathedral c.1080-1110 has revealed evidence of ongoing settlement and redevelopment. Introduction of industrial and domestic midden material formed an integral part of the levelling process and enabled interpretation of activities related to these industrial processes via tracking the redistribution of this material. Interpretation of the botanical and organic assemblages has helped highlight periods of domestic middening over time, whilst emphasising the enriched nature of the soils that have resulted from the introduction of domestic waste.

## 2.0 INTRODUCTION

A total of 10 bulk samples were selected and submitted for specialist analysis. The samples were processed and analysed to determine the range of inorganic material and environmental evidence retained within the deposits. It was anticipated that the comparative analysis of these samples would help determine the depositional nature of a series of probable floor and levelling deposits, and contribute to the overall understanding of the archaeology related to the site

## 3.0 METHODOLOGY

### 3.1 BULK SAMPLE PROCESSING

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

Wet retents were spread out on plastic trays and examined visually before being tagged and dried. The flot material was wrapped in blue acid-free paper, tagged and recorded before being air dried on trays in a warm drying room. Once dried, the retents were sieved using 4mm and 2mm *Endicot* sieves and sorted using magnified illuminated lamps for all categories of artefacts and ecofacts. A magnet was employed to locate magnetized stone and metals.

Sorting of flots was undertaken using a *Nikon 93756* binocular microscope at variable magnifications of between x8 and x40 with associated *Schott KL-1500 LCD* cold light source. Sorted materials were bagged and labelled for submission to specialists and weighed (where relevant) using an *Ohaus CS200* digital scale calibrated to 0.01g. Sorted residues were also weighed on a digital scale, bagged and stored pending decision regarding disposal.

## 3.2 BOTANICAL MATERIAL IDENTIFICATION

Botanical material from each sorted flotation retent was added to the corresponding flot before being sorted through a 500µm, 1mm and 4mm sieve. Charcoal >4mm was 50% or 100% identified in each case depending on volume in order to characterise the assemblage present. Charcoal identification in all cases was undertaken with reference to Schweingruber (1990) using the reflected light of a Zenith metallurgical microscope at X63 magnification. The botanical assemblage was 100% analysed for carbonised cereals, seeds and other macroplant remains. Cereal identification was achieved with reference to Jacomet (1987). Seed identification was undertaken with reference to Beijerinck (1947), Cappers (2006) and the Dickson botanical reference collection. Plant nomenclature follows Stace (1997) except cereals, which conform to Zohary & Hopf (2000).

## 3.3 MOLLUSCS, MARINE BIVALVES AND OTHER SHELL IDENTIFICATION

Molluscs were sorted initially by shape before specific identification and habitat criteria were achieved using Cameron & Kerney 1979, Evans 1972 and Claassen 1998 and modern reference materials. Molluscs were tallied and relative abundances of identifiable taxa noted. Marine bivalves were generally fragmented, although occasional larger fragments were observed and identification was achieved using McMillan 1968.

## 4.0 RESULTS

### 4.1 PHASE 1 LIFESPAN OF THE VIA QUINTANA

<10> (6035) Thin trample deposit or accumulated soil over lower metalled road surface

The majority of the sample was composed of fragments of building materials with a significant amount of red/orange brick type CBM. A few CBM fragments had what appeared to be trace of a brown/green glaze. A small amount of very white mortar was present and a small fragment of plaster with a red pigment covering was recovered. The metal assemblage was significant and contained heavily oxidised nails fused with CBM and metal working debris.

Very few botanical remains were recovered with only some fragments of charcoal identifiable as oak (Quercus) and one fragment of poplar/willow (Populus/Salix), most of the charcoal fragments were small flecks. No other organic components were recovered from the sample apart from a small quantity of bone fragments.

<9> (6032) Accumulated silt over metalled road surface

This sample was similar in composition to sample <10> but had a lesser abundance of building type materials. A small amount of CBM composed of red/orange brick type material was recovered, very small fragments of mortar and a small assemblage of metal made up of heavily oxidised and magnetic fragments. Again, the sample contained very little diagnostic organic or inorganic components other than a few fragments of bone and 2 fragments of charcoal, identified as oak (*Quercus*) which appeared to derive from round wood rather than larger trunk wood.

### 4.2 PHASE 2 COLLAPSE OF BASILICA

<8> (6030) Roof debris of the late basilica on top of the last metalled road surface

Associated with the collapsed roof of the basilica, the deposit contained and abundance of mortar and CBM fragments, some of which had curved edges synonymous with roof tiles. The abundance of mortar was in equal proportion to the CBM and was mainly composed of grey/white material with various inclusions including shell, quartz and pebbles. Possible domestic waste was evident in the form of bone, eggshell and fish scales suggesting some form of input from local occupation.

Four fragments of oak (*Quercus*) charcoal were identified but were fairly small in size and the remainder of the charcoal assemblage consisted of very small flecks. The sample contained

one indeterminate carbonised cereal grain fragment which could not be identified due to poor preservation. Elder (*Sambucus nigra/racemosa*) seeds were uncarbonised and the sample was not from a waterlogged context it is likely that these seeds are modern contaminants; however because these seeds are typically fairly robust it is possible they may be contemporary with deposition and not introduced to the deposit at a later date. Elder is usually prolific on enriched fertilised soils which could have been an outcome of the deposition of domestic waste.

4.3 PHASE 3 POSSIBLE POST-ROMAN OCCUPATION OF THE FORTRESS AREA

<7> (6025) Possible floor surface

The context was described as a spread of burnt material, possibly a floor surface. It contained a small amount of CBM and a larger quantity of white/grey mortar with pebble and shell inclusions. In addition, a large lump of oxidised metal was also recovered from the sample and a moderate quantity of bone, and an abundance of cinder was also recorded. The pottery assemblage consisted of one shard of black wheel turned pot with a grey white fabric and one orange shard with orange fabric.

The charcoal assemblage was fairly abundant consisting of 17 fragments of oak (*Quercus*) and 8 of alder (*Alnus*), with some fragments of pine (*Pinus*) also identified. None of the fragments were of a particularly large size but fairly small and fragmentary and appeared to derive from smaller round wood rather than larger plank wood. Possible burnt daub fragments were recovered during excavation, but the charcoal assemblage did not appear to derive from burning of larger trunk wood. Oak and pine would typically have been used for structural timbers, suggesting a hearth source as opposed to a burnt structure.

The only seeds recovered from the sample were uncarbonised elder (*Sambucus nigra/racemosa*) which may be present as a modern contaminant. Only one terrestrial mollusc was recovered and identified as a smooth grass snail (*Vallonia pulchella)* which is commonly associated with open moist grassland with fairly calcareous soils. One rams horn snail (*Planorbis* cf *planorbis*) was also recovered. This is a freshwater snail and favours weedy water such as ditches and small ponds and is the only freshwater snail recovered from the range of samples indicating the existence of a body of standing water within the close vicinity.

<6> (6023) Possible levelling deposit

Described as a possible levelling deposit, the sample contained an abundance of red CBM with a substantial amount of a grey/white mortar with small pebble and quartz inclusions. Significantly, a very small fragment of a gold metallic foil which may possibly be gold leaf was recovered but it would be difficult to make any further interpretation as only one fragment of less than 1mm was found. Pottery shards were badly degraded, black in colour with an orange fabric and indeterminate small metal fragments were also recovered.

The sample was fairly charcoal rich with fragments identified as oak (*Quercus*) and alder (*Alnus*) with an abundance of unidentifiable small charcoal flecks. A small amount of cinder was also noted. Only a small number of uncarbonised elder (*Sambucus nigra/racemosa*) seeds were recovered.

An abundance of other organic remains were recovered including fish scales, bone fragments and oyster (*Ostrea edulis*) shell suggesting a high level of input from general household waste. More than 80 oyster shell fragments were counted including some which were very large and almost whole valves. One fragment of mussel (*Mytilus edulis*) shell was also found which could suggest the abundance and occurrence of oyster shell is also a product of food waste alongside the other organic components.

<5> (6021) Possible crude floor

The deposit was described as an ashy accumulated soil and possibly associated with a paved surface which contained a significant amount of white/grey mortar with pebble inclusions and CBM in an equal abundance. The crushed up mortar within the deposit may have contributed to the ashy appearance. The metal assemblage consisted of a few fragments of heavily oxidised iron, one small fragment of lead and some small fragments of a glassy slag were also recorded.

Only three larger fragments of charcoal were found and identified as pine (*Pinus* sp) and oak (*Quercus*), the rest of the charcoal assemblage consisted of very small flecks and a small amount of cinder was also noted. One carbonised wheat cereal grain (*Triticum* cf *aestivum*), probably bread wheat, was recovered but no other carbonised remains were present. A moderate amount of bone and eggshell fragments were recovered but no fish scales were found. The presence of charcoal, cinder, carbonised cereal and bone fragments probably suggests an input from household and hearth waste.

The terrestrial molluscs present indicate a moist to dry fairly open habitat with some areas of more vegetated sheltered ground. Very few marine shell fragments were recovered with only

example of each of oyster and mussel shell. This sample as a whole may possibly reflect a slight decrease in deposition of household waste due to the lesser abundance of bone and oyster shell, which may corroborate the interpretation as an interior floor.

4.4 PHASE 5 POSSIBLE CLEARANCE AND LEVELLING IN THE LATE ANGLO-SCAND/EARLY NORMAN PERIOD

<4> (6012) Possible trample

This deposit was described as trample material between successive surfaces and contained a moderate amount of CBM and a small amount of mortar. One shard of pottery was recovered which was red/orange with an orange fabric but no other fragments were found.

Charcoal was not present in abundance but included a diverse range of taxa including alder (*Alnus*), ash (*Fraxinus*), plum/cherry (Prunoideae) and oak (*Quercus*) all of which appeared to have derived from small branches or twigs. One carbonised ribwort plantain (*Plantago lanceolata*) was recovered but no other carbonised botanical remains were found. Ribwort plantain is commonly found on cultivated ground associated with cereal crops although no grains were found within this sample.

The sample contained a small bone assemblage, fish scales and some fragments of oyster shell but no other mollusc or bivalve shell was found.

4.5 PHASE 6 LANDSCAPING AND CONSTRUCTION DEPOSITS OF THOMAS' CATHEDRAL C.1080-1110

<3> (6010) Ground make-up or trample

The deposit contained a significant amount of CBM and mortar with shell inclusions. The metal assemblage was composed of several oxidised iron fragments, a small piece of lead and an alloy rivet which was not magnetic. The pottery assemblage was significant totalling 14 shards and included thin grey ware, coarse black ware with white shell inclusions and possible Samian. In addition, there was one fragment of a glassy type slag which was black in colour and a small assemblage of white plaster with traces of red pigment coating.

The sample contained a varied charcoal assemblage including alder (*Alnus*), hazel (*Corylus*), pine (*Pinus* sp), poplar/willow (*Populus*/*Salix*), cherry (*Prunus* sp) and oak (*Quercus*). All were probably from small branches or twigs the fragments appeared to be from round wood. The sample also contained and abundance of cinder which together with the charcoal assemblage possibly indicates a domestic hearth waste source.

Carbonised seeds recovered were one indeterminate cereal grain and one dock (*Rumex* sp) which although limited may be reflecting cereal processing. Docks are common crop weeds found on arable land and were probably unintentionally harvested together with the cereal crop.

Mussel (*Mytilus edulis*) and oyster (*Ostrea edulis*) shell fragments were abundant and a substantial amount of bone fragments were also recovered, along with a small number of fragmented fish scales. The terrestrial mollusc assemblage includes clear glass snails (*Aegopinella pura*) which prefer a moist habitat and commonly found in ground litter in deciduous woods, and others which prefer a drier more open grassland habitat.

<2> (6006) Trample deposit

The deposit contained a significant amount of mortar and CBM in equal proportions. Three fragments of metal, one shard of clear glass and one shard of black glass were recovered, and a small amount of coal/cinder was noted. Some metal in the form of slag spheres was recovered. The pottery assemblage contained one shard of coarse black pot with white shell inclusions and one very thin shard with a metallic patina. A moderate amount of bone fragments were also present

The charcoal assemblage consisted of oak, ash and hazel with fragments being slightly larger in size compared to the other samples, but still appeared to have been small twigs or branches.
A varied assemblage of carbonised cereal grains were recovered, although not in any great abundance. All of the carbonised seeds derive from common weeds of cultivated ground and have an association as crop weeds of arable agriculture. The presence of these carbonised seeds alongside the cereal grains is suggestive of cereal processing ahead of food preparation.

The terrestrial mollusc taxa indicate the presence of a more damp, densely vegetated habitat with dryer open areas also within the vicinity. No marine shell was present in the sample.

<1> (6005) Ground make-up deposit

A significant amount of mortar which was grey/white with pebble and quartz inclusions and a medium assemblage of CBM was recovered, and a very large assemblage of industrial slag material with a glassy finish. One pottery shard was present which was grey with a grey

fabric. A small amount of shell was recovered and was mainly marine shell but a very small amount of cream coloured eggshell was also recovered.

Charcoal fragments were identified as ash, poplar/willow/, plum/cherry and oak. All of the charcoal appeared to have originated from small branches or twigs with no suggestion of a trunk wood source. The sample did not contain any other carbonised or uncarbonised plant material and only a limited number of marine shell fragments were present with one each of mussel and oyster. The terrestrial mollusc assemblage was identified as taxa associated with damper conditions with well vegetated areas.

## 5.0 DISCUSSION

CBM and mortar was recorded in almost all of the samples and in abundance in some, indicating a high level of input from various forms of demolition debris material or general dilapidation of buildings. The building material assemblage may be reflecting intentional dumping of waste for levelling purposes and corroborates the initial interpretation of these deposits. Of particular note, a very small fragment of a gold metallic foil which may possibly be gold leaf was recovered from one of the samples but it would be difficult to make any tentative interpretation as only one fragment of less than 1mm was found

The presence of metal, slag and slag spheres in some of the samples is strongly suggestive of metalworking waste. Slag spheres (spherical hammerscale) results from the solidification of small droplets of liquid slag expelled from within the iron during hot working. This happens particularly when two components are fire-welded together, but also during the primary smithing of the bloom into a bar or billet (Starley 1995). These components are particularly important in the interpretation of a site as they are often found in the immediate vicinity of the smithing hearth and anvil somewhere in the vicinity. This is particularly significant in the phase 6 samples as they are the only ones to contain slag spheres.

All of the identifiable charcoal fragments were very small and most of them probably derived from small branches or twigs as none were observed to be obviously from trunk wood so unlikely to have originated from the burning of structural timbers. The majority of the charcoal fragments recorded in the flot analysis were small flecks, with no further recordable qualities other than relative abundance.

The charcoal assemblage from the site as a whole was primarily oak (*Quercus*). Other charcoal taxa recorded included alder (*Alnus*), hazel (*Corylus*), poplar/willow (*Populus/Salix*) and plum/cherry type (Prunoideae). Together this charcoal assemblage probably reflects collection of fuel from local mixed deciduous woodland resources. The predominance of oak

charcoal in many of the samples suggests a primary reliance on this wood type for fuel. Hazel, plum/cherry type and poplar/willow could reflect either structural wattle panelling or collection for kindling, whether for domestic fuel or industrial fires which may account for the varied charcoal assemblages found in Phases 5 and 6.

Three samples all from different phases contained charcoal identified as pine (*Pinus* sp) and may be the only examples that have possibly derived from trunk wood. Certain types of pine, particularly Scots pine, produces excellent timbers and the wood has commonly been used for a variety of structural purposes including roofing shingles and roof beams (Gale & Cutler 2000). The charcoal fragments possibly represent re use of structural timbers for domestic hearths.

The samples in phase 6 related to the landscaping and construction deposits of the cathedral all contain a significant amount of cinder, charcoal, slag and slag spheres which would point towards a strong possibility of metal working within the close vicinity. Oak charcoal has been the smelting fuel of choice since antiquity (Tylecote 1962, Dickson & Dickson 2000), attaining temperatures in excess of 1600$^{o}$C for prolonged periods. The samples do contain oak which is synonymous with metalworking but not in any great abundance compared to other samples as the assemblages also contain charcoal from other taxa.

Evidence of cereal processing was found in some of the contexts, particularly (6006) which contained carbonised oat, barley and wheat grains along with commonly associated crop weed seeds. In particular, black bindweed is a common weed of arable field and may possibly have been intentionally allowed to grow within the main crop and harvested for food (Mabey 1996). It is likely that the grains are residual from accidental loss during the parching stage of cereal processing. The poor state of preservation of most of them is highly suggestive of either erosive degradation or prolonged exposure to direct heat within the hearth, or both. Hearth debris may have been dumped along with other household rubbish contributing to the composition of the deposits. Interpretations as hearth waste are given more credence when corroborated by the presence of other waste or refuse materials including cereals, edible mollusc shells and animal bone. Evidence of general household waste deposition is particularly prolific within the Phase 3 deposits which are associated with possible post Roman occupation of the fortress area.

During phase 1 the soils of the road surface deposits appear to have been kept fairly clear and free of any source of botanical and organic input. This may be due to the nature of the road being exposed to constant use or intentionally being kept clear of vegetation and detritus. During phase 6 the soils were probably more calcareous and better drained than

earlier soils and deposits which were enriched by middening. This is evident from the higher abundance of terrestrial molluscs and lack of elder seeds in these soils.

Elder is a robust seed that persists in the soil longer than species that are more fragile and brittle. If they are found within contexts that may have been disturbed or subject to bioturbation then it is possible and quite likely that the seeds recorded are relict from a more varied, relatively modern seed bank. However, they did not occur in any great abundance which could suggest they are remnant from a larger assemblage contemporary with the deposit.

Large deposits of oyster shells may either be evidence of ritual practices such as feasting or more likely the detritus of everyday food being consumed. When oyster shell is found with fish remains such as fish scales, it suggests they may have been a constituent of organic manure used to enhance nutrient poor soils (Alcock 1998). Soil enrichment would correspond with the presence of elder seeds. Instances of oyster shell also occurs with mussel shells suggesting that this was a general food source rather than oyster being present due to ritual reasons.

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| | Sample information (Volumes in L) | | | | Sorting % | | Sample weights (g) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Context | Num | Type | Vol | RVol | Enviro | CBM | C.V. | Plant macros | Wood | Bone | Shell | Pottery | CTP | CBM | Metal | Glass | Slate | Mortar | Coal | Plaster | Industrial |
| **6035** | 10 | GBA | 10 | 1.00 | 100 | 75 | | | | 1.80 | | | | 273.50 | 44.01 | | | 32.81 | | 1.70 | CBM with paint or glaze 44.09 |
| **6032** | 9 | GBA | 10 | 0.40 | 100 | 75 | | | | 3.30 | | | | 8.00 | 5.40 | | | | | | |
| **6030** | 8 | GBA | 10 | 1.80 | 100 | 75 | | | | 16.47 | 0.23 | | | 280.97 | | | | 264.20 | | | Egg shell 0.04 |
| **6025** | 7 | GBA | 10 | 0.90 | 100 | 75 | 1.12 | | | 1.45 | | 27.18 | | 38.50 | 9.84 | | | 261.35 | | | |
| **6023** | 6 | GBA | 10 | 1.10 | 100 | 75 | 0.65 | | | 28.20 | 101.58 | 1.44 | | 278.35 | 6.63 | | | 75.73 | | | Egg shell 0.05 |
| **6021** | 5 | GBA | 10 | 1.50 | 100 | 75 | | | | 7.32 | 0.60 | | | 142.41 | 4.47 | | | 184.60 | | | Egg shell 0.01 |
| **6012** | 4 | GBA | 10 | 0.50 | 100 | 75 | 0.08 | | | 13.41 | 3.85 | 0.47 | | 66.70 | | | | 12.32 | | | |
| **6010** | 3 | GBA | 10 | 0.50 | 100 | 75 | 0.25 | | | 25.90 | 23.30 | 18.20 | | 167.20 | 7.70 | 0.01 | | 54.60 | | 5.40 | |
| **6006** | 2 | GBA | 10 | 0.50 | 100 | 75 | 0.13 | | | 15.80 | 1.00 | 3.12 | | 107.20 | 1.05 | 0.20 | | 133.62 | 0.30 | | |
| **6005** | 1 | GBA | 10 | 0.60 | 100 | 75 | | | | 50.37 | 1.20 | 7.00 | | 29.33 | 2.90 | | | 247.50 | 6.00 | | 45.70 Egg shell 0.01 |
| | | | | | | | | | | | | | | | | | | | | | |
| **5120** | 1 | GBA | 10 | 0.50 | 100 | 100 | 0.22 | | | 4.10 | 0.23 | 0.47 | | 11.81 | | | | 85.47 | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| **6100** | 43 | GBA | 10 | 0.40 | 100 | 100 | | | | 46.32 | 0.50 | 0.74 | | 3.34 | 2.23 | 1.01 | | 174.19 | 0.12 | | Egg shell 0.11 & Imprinted mortar 25.66 |
| **6044** | 35 | GBA | 10 | 0.50 | 100 | 100 | | | | 0.30 | | 0.95 | | 28.30 | 2.00 | | | 10.71 | | | |
| **6043** | 34 | GBA | 10 | 0.10 | 100 | 100 | | | | | | | | | 3.72 | | | 43.10 | 0.01 | | |
| **6041** | 33 | GBA | 10 | 0.01 | 100 | 100 | | | | | | | | | 20.01 | | | | | | |
| **6039** | 32 | GBA | 10 | 0.30 | 100 | 100 | | | | | | | | 12.00 | 0.01 | | | 42.58 | 0.02 | | |

*Table 13 Environmental sample sorting results 1*

| YORK MINSTER, UNDERCROFT TREASURY | Set | 2 | 4 | 6 | 8 | 8 | 9 | 13 | 14 | 15 | 16 | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| YMM 5104 A/5104 D | Group | 1 | 2 | 4 | 6 | 6 | 6 | 9 | 10 | 10 | 10 | | | | | | |
| | Phase | 1 | 1 | 2 | 3 | 3 | 3 | 5 | 6 | 6 | 6 | | | | | | |
| | Context | 6035 | 6032 | 6030 | 6025 | 6023 | 6021 | 6012 | 6010 | 6006 | 6005 | 5120 | 6039 | 6041 | 6043 | 6044 | 6100 |
| | Sample | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 1 | 32 | 33 | 34 | 35 | 43 |
| **FLOT COMPOSITION (1-5 ABUNDANCE SCALE)** | | | | | | | | | | | | | | | | | |
| **TOTAL FLOT VOLUME** | | 2ml | 2ml | 6ml | 22ml | 18ml | 3ml | 4ml | 20ml | 30ml | 100ml | 2ml | 2ml | 1ml | 1ml | 2ml | 5ml |
| Roots | | - | - | - | - | - | - | - | - | - | - | + | - | - | ++++ | - | ++++ |
| Metal foil (modern?) | | - | - | - | - | - | - | - | - | - | - | - | - | - | + | - | + |
| Plastic/polystyrene | | - | - | - | - | - | - | - | - | - | - | - | + | + | + | - | + |
| Charcoal | | +++ | +++ | +++ | +++ | ++++ | +++ | +++ | ++++ | ++++ | +++ | +++ | + | + | + | +++ | ++ |
| Coal | | - | - | - | - | + | + | - | ++ | + | + | +++ | - | - | - | - | - |
| Cinder | | + | - | - | ++ | + | + | - | ++ | +++ | ++++ | - | - | - | - | - | - |
| Gold leaf (?) | | - | - | - | - | + | - | - | - | - | - | - | - | - | - | - | - |
| Bone | | - | + | + | + | ++ | + | + | ++ | ++ | ++ | - | - | - | - | + | + |
| Fish scales | | - | - | + | - | +++ | - | + | + | + | + | - | - | - | - | + | + |
| Egg shell | | - | - | - | - | - | - | - | - | + | - | - | - | - | - | - | - |
| Mollusc/shell | | - | - | ++ | + | ++ | + | + | + | ++ | ++ | - | + | - | + | ++ | + |
| Insect/invertebrates | | - | - | - | - | - | - | - | - | - | - | - | - | + | ++ | - | +++ |
| Cereal | | - | - | + | - | - | + | - | - | ++ | - | - | - | - | - | - | - |
| Seed | | - | - | + | + | + | ++ | + | + | ++ | - | - | - | - | - | - | - |
| Slag (metal) | | - | - | - | - | - | - | + | - | - | + | - | - | - | - | - | - |
| Slag (glassy) | | - | - | - | - | - | + | - | - | + | - | - | - | - | - | - | + |
| Slag spheres | | - | - | - | - | - | - | - | - | + | ++ | - | - | - | - | - | - |
| CBM | | ++ | + | +++ | - | ++ | ++ | +++ | - | + | + | ++ | + | + | - | - | + |
| Mortar | | + | + | +++ | - | + | - | - | - | + | - | - | + | - | - | - | + |
| **Total Charcoal (F+R)** | | | | | | | | | | | | | | | | | |
| Charcoal >4mm (100% ID) | | 1ml | <0.5ml | 0.5ml | 12ml | 10ml | <0.5ml | 1ml | 3ml | 4ml | 3ml | <0.5ml | - | - | - | - | 1ml |
| Charcoal <4mm | | 0.5ml | 0.5ml | 2ml | 10ml | 10ml | 1ml | 2ml | 15ml | 18ml | 30ml | 0.5ml | <0.5ml | <0.5ml | <0.5ml | 0.5ml | 3ml |
| **Charcoal** | **Common Name** | | | | | | | | | | | | | | | | |
| *Alnus* | alder | - | - | - | 8 (0.42g) | 10 (0.48g) | - | 1 (0.01g) | 1 (0.01g) | - | - | - | - | - | - | - | - |
| *Corylus* | hazel | - | - | - | - | - | - | - | 1 (0.05g) | 2 (0.15g) | - | - | - | - | - | - | - |
| *Fraxinus* | ash | - | - | - | - | - | - | 1 (0.02g) | - | 1 (0.09g) | 1 (0.04g) | - | - | - | - | - | - |
| *Pinus* sp | pine | - | - | - | 1 (0.05g) | - | 2 (0.01g) | - | 1 (0.04g) | - | - | - | - | - | - | - | - |
| cf *Pinus* sp | pine | - | - | - | 1 (0.06g) | - | - | - | - | - | - | - | - | - | - | - | - |
| *Populus/Salix* | poplar/willow | 1 (0.01g) | - | - | - | - | - | - | 1 (0.05g) | - | 3 (0.08g) | - | - | - | - | - | 3 (0.03g) |
| Prunoideae | plum/cherry | - | - | - | - | - | - | 1 (0.01g) | - | - | 3 (0.12g) | - | - | - | - | - | - |
| *Prunus* sp | cherry | - | - | - | - | - | - | - | 1 (0.10g) | - | - | - | - | - | - | - | - |
| *Quercus* | oak | 5 (0.04g) | 2 (0.01g) | 4 ( 0.03g) | 17 (0.68g) | 14 (0.67g) | 1 (0.01g) | 2 (0.04g) | 5 (0.14g) | 4 (0.12g) | 3 (0.06g) | 4 (0.09g) | - | - | - | - | - |

| **Cereals (c)** | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Avena sativa/strigosa* | cultivated /black oat | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *Avena/ Secale* fgmt | oat/rye | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *cf Hordeum vulgare sl* | cf 6-row barley | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *Triticum sp* | wheat | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - |
| cf *Triticum aestivum* | bread wheat | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *Triticum cf aestivum* | bread wheat | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - |
| Indet. fgmt. | cereal grain fgmt. | - | - | 1 | - | - | - | - | 1 | 3 | - | - | - | - | - | - | - |
| | **Context** | **6035** | **6032** | **6030** | **6025** | **6023** | **6021** | **6012** | **6010** | **6006** | **6005** | **5120** | **6039** | **6041** | **6043** | **6044** | **6100** |
| | **Sample** | **10** | **9** | **8** | **7** | **6** | **5** | **4** | **3** | **2** | **1** | **1** | **32** | **33** | **34** | **35** | **43** |
| **Other macros (c)** | **Common Name** | | | | | | | | | | | | | | | | |
| *Chenopodium album* | fat hen | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *Fallopia convulvulus* | black bindweed | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *Persicaria maculosa* | redshank | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *Plantago lanceolata* | ribwort plantain | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - |
| *Rumex* sp | docks | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - |
| Indet. seed pod fgmt. | seed pod fgmt. | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| **Macros (nc)** | | | | | | | | | | | | | | | | | |
| Broad leaf fgmt. | broad leaf fgmt. | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| *Sambucus nigra/racemosa* | elder/red-berried elder | - | - | 7 | 4 | 1 | 6 | 1 | 4 | - | - | - | - | - | - | - | - |
| *Sambucus nigra/racemosa*fgmt. | elder/red-berried elder | - | - | 3 | - | 2 | 7 | 3 | 3 | - | - | - | - | - | - | - | - |
| **Terrestrial Molluscs** | | | | | | | | | | | | | | | | | |
| *Aegopinella pura* | clear glass snail | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - |
| *Cecilioides acicula* | blind snail | - | - | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - |
| *Cochlicopa* sp | pillar snails | - | - | - | - | - | - | - | - | 4 | 2 | - | - | - | - | - | - |
| *Columella edentula* | toothless column snail | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| *Discus rotundatus* | rounded snail | - | - | - | - | - | 1 | - | - | 4 | 4 | - | - | - | - | - | - |
| *Nesovitrea hammonis* | rayed glass snail | - | - | - | - | - | - | - | - | 4 | 2 | - | - | - | - | - | - |
| *Pupilla muscorum* | moss chrysalis snail | - | - | 3 | - | 3 | 4 | - | 4 | 4 | 3 | - | - | - | - | 1 | - |
| *Vallonia costata* | ribbed grass snail | - | - | - | - | - | - | - | - | - | 4 | - | - | - | - | 3 | - |
| *Vallonia excentrica* | eccentric grass snail | - | - | - | - | - | 4 | - | 3 | - | 1 | - | - | - | - | - | - |
| *Vallonia pulchella* | smooth grass snail | - | - | - | 1 | 6 | - | - | - | - | - | - | - | - | - | - | - |
| *Vertigo substriata* | striated whorl snail | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |
| Indet / juvenile fgmts. | indeterminate | - | - | 5 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| **Freshwater Molluscs** | | | | | | | | | | | | | | | | | |
| *Planorbis*cf *planorbis* | rams horn snail | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - |
| **Marine Bivalves** | | | | | | | | | | | | | | | | | |
| cf *Mytilus edulis*fgmt. | blue/edible mussel | - | - | - | - | 1 | 1 | - | <10 | - | 1 | 1 | - | - | - | - | - |
| *Ostrea edulis*fgmt. (*includes large fgmts.) | native/European flat oyster | - | - | - | - | >80* (98.05g) | 1 (0.67g) | 15 (3.62g) | 18 (19.82g) | - | 1 (0.03g) | 1 (0.05g) | - | - | - | 3 (0.02g) | - |

*Table 14 Environmental sample sorting results 2*

| CODE | | DEFINITION | COMMENT |
|---|---|---|---|
| Sample | Context | Context number | |
| | Num | Sample number | |
| | Type | Type of sample | (BS: Bulk sample ; Flot: Flotation; GBA) |
| | Vol | Sample volume before processing | |
| | Res. Vol | Residue volume before flotation and sorting | |
| Sorting % | Enviro | All environmental material. | Should always be 100% except specific circumstances like a very large amount of charcoal. In this case it should be mentioned in the text that charcoal was only 50% sorted for instance. |
| | CBM | Ceramic Building Material | Usually less than 100%, especially if large quantities |
| Sample weights (g) | C.V | Charred Vegetation | |
| | Plant Macros | All plant macrofossils | e.g. seeds, nut shells, roots, etc. |
| | Wood | | |
| | Faunal | Animal and human remains | All bone material including teeth, antler and horn cores, horn, fish, bird and amphibian, eggshells. |
| | Shell | Freshwater and marine molluscs | |
| | Pottery | Ceramics | Pottery, e.g. sherds and rims |
| | CTP | Clay Tobacco Pipe | |
| | CBM | Ceramic Building Material | Brick, tile, chimney, clay pipe, etc. |
| | Metal | | |
| | Glass | | |
| | Slate | | |
| | Mortar | | |
| | Coal | | |
| | Plaster | | |
| | Stone Lithic | Stone tools and debitage | e.g. worked flint, chert, quartz etc. |
| | Stone Wkd | Worked stone including masonry | e.g. quern stone, entablature, etc. |
| | Stone Other | Anomaly or noteworthy | |
| | Industrial Slag | Metal and glass slag | |
| | Industrial Other | Other industrial material/products | e.g. lime |

*Table 15 Soil sample sorting codes*

## APPENDIX 7: CONTEXT AND SAMPLE REGISTER

| CONTEXT | DESCRIPTION | SET | GROUP | PHASE | GBA# | MM# | OSL# | MORTAR# |
|---|---|---|---|---|---|---|---|---|
| 6000 | Unstratified | 18 | 11 | 7 | | | | |
| 6001 | S C19th pier | 17 | 11 | 7 | | | | |
| 6002 | N C19th pier | 17 | 11 | 7 | | | | |
| 6003 | Cons cut for 6001 | 17 | 11 | 7 | | | | |
| 6004 | Cons cut for 6002 | 17 | 11 | 7 | | | | |
| 6005 | Make up | 16 | 10 | 6 | 1 | 11 | | |
| 6006 | Trample | 15 | 10 | 6 | 2 | 11 | 24 | |
| 6007 | Cons spread | 15 | 10 | 6 | | 11/12 | | |
| 6008 | Trample | 15 | 10 | 6 | | 12/13/14 | 25 | |
| 6009 | Make up | 14 | 10 | 6 | | 13/14/15 | 26 | |
| 6010 | Make up | 14 | 10 | 6 | 3 | 14/15/16 | 27 | |
| 6011 | Surface | 13 | 9 | 5 | | 15/16 | | |
| 6012 | Trample | 13 | 9 | 5 | 4 | 16/17 | 28 | |
| 6013 | Levelling | 13 | 9 | 5 | | | | |
| 6014 | Surface | 12 | 8 | 4 | | 17 | | |
| 6015 | Trample | 12 | 8 | 4 | | 17/18 | 29 | |
| 6016 | Surface | 11 | 7 | 4 | | 18 | | |
| 6017 | Trample | 11 | 7 | 4 | | 18 | | |
| 6018 | Surface | 11 | 7 | 4 | | 18/19 | 30 | |
| 6019 | Fill | 10 | 7 | 4 | | | | |
| 6020 | Cut (pot hole) | 10 | 7 | 4 | | | | |
| 6021 | Surface | 9 | 6 | 3 | 5 | 19/20 | 31 | |
| 6022 | Make up | 9 | 6 | 3 | | 20 | | |
| 6023 | Levelling | 8 | 6 | 3 | 6 | | | |
| 6024 | Spread | 8 | 6 | 3 | | 21 | | |
| 6025 | Surface/spread | 8 | 6 | 3 | 7 | 21 | | |
| 6026 | Spread | 8 | 6 | 3 | | 21/22 | | |
| 6027 | Surface | 7 | 5 | 3 | | 22 | | |
| 6028 | ?Surface | 7 | 5 | 3 | | 22/23 | | |
| 6029 | Spread | 7 | 5 | 3 | | 23 | | |
| 6030 | Levelling | 6 | 4 | 2 | 8 | | | |
| 6031 | Surface | 5 | 3 | 1 | | | | |
| 6032 | Make up | 4 | 2 | 1 | 9 | | | |
| 6033 | Surface | 3 | 2 | 1 | | | | |
| 6034 | ?Repair | 3 | 2 | 1 | | | | |
| 6035 | Trample | 2 | 1 | 1 | 10 | | | |
| 6036 | Surface | 1 | 1 | 1 | | | | |
| 6037 | Make up | 1 | 1 | 1 | | | | |
| 6038 | Threshold/WC30 | | | | | | | |
| 6039 | Bedding 6038 | | | | 32 | | | |
| 6040 | Gritstone frag | | | | | | | |
| 6041 | Soil below 6040 | | | | 33 | | | |
| 6042 | Limestone block | | | | | | | |
| 6043 | Soil below 6042 | | | | 34 | | | |
| 6044 | Soil between 6038/6054 | | | | 35 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 6045 | Mortar below 6042 | | | | | | | 36 |
| 6046 | Mortar below 6038 | | | | | | | 37-39 |
| 6047 | Mortar SE of 6038 | | | | | | | 40 |
| 6048 | Mortar of 6051 | | | | | | | 41 |
| 6049 | Mortar of 6052 | | | | | | | 42 |
| 6050 | Fe cramp below 6040 | | | | | | | |
| 6051 | Basilica upper course/WC16 | | | | | | | |
| 6052 | Basilica lower course/WC16 | | | | | | | |
| 6053 | Gritstone threshold base/WC29 | | | | | | | |
| 6054 | Limestone block/WC44 | | | | | | | |
| 6055 | Mortar joint | | | | | | | |
| 6056 | Foundation of 6052/6051 | | | | | | | |

*Table 16 Context and sample register*