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A Medieval Water Tank in the Cloister Garth of Gloucester Cathedral

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Postscript

As the result of increasing erosion of the marsh cliff at Oldbury-on-Severn, further examples of possible slingshot have been recovered at much the same horizon and in a similar context to those described above. This additional material is composed of eight, smooth, rounded to well-rounded, discoidal to tetrahedral pebbles of a variety of tough, compact quartzites, weighing respectively 18.0, 30.0, 31.9, 50.1, 55.3, 56.6, 59.5 and 84.9 gm and one of vein quartz weighing 56.3 gm.

J.R.L. ALLEN

A MEDIEVAL WATER TANK IN THE CLOISTER GARTH OF GLOUCESTER CATHEDRAL

Introduction

In the north-west corner of the cloister garth of Gloucester Cathedral is a sunken stone tank (Fig. 1). It was discovered in 1887 (Welander 1991, 481) or 1889 (Hope 1897, 130), during the lowering of the ground level in the garth. The tank was restored in the late 19th century and left open thereafter, probably filling with debris, its stonework deteriorating.

In 1995 problems with drainage necessitated the re-excavation and repair of several Victorian drains. One of these led west from the tank; it was re-excavated and a manhole inserted. An archaeological watching brief (Heighway 1999, record no. 26) carried out during this process recorded details of the medieval culvert which originally also drained from the west end of the tank.

In 1996 a refurbishment of the cloister garth was carried out. The paths were relaid, a central foundation installed, and paving laid. A watching brief on this process provided evidence of mortar working floors and retrieved a collection of unstratified Roman and medieval pottery and finds (Heighway 1999, record no. 30: summary in *Trans. B.G.A.S.* **115**, 284). As part of the process of improvement, the decision was taken to infill and pave over the tank to preserve it from further frost damage and also to ensure the safety of visitors. Before infilling a full survey was commissioned from Gloucester Archaeology Unit; a series of photographs was taken by Alan Norton, clerk of works at the cathedral.

Description

The tank is built of local Painswick stone, with base slabs forming the foundations for the side walls which were built of well-jointed ashlars. The tank is rectangular except at the west end where it funnels into a narrow channel 0.35 m wide, at which point was a double sluice gate (Figs. 7–9). West of the sluice the water drained into a medieval stone culvert, which runs out under the west walk of the cloister (Fig. 2). At the junction between the sluice and the drain was a shaft, roughly semi-circular in plan (Fig. 7) and accessible from ground level. The surviving facing indicates that the shaft was 1.15 m deep from the surface to the drain base. This feature must have served as a manhole to give access to the sluice, which would otherwise have been inaccessible. The shaft was entirely refaced in Victorian concrete, but it is to be presumed that the restorers imitated a feature that already existed. The base of the tank slopes from east to west and the slope was continued down into the drain under the cloister walk; the level at the west end of the tank was 13.22 above O.D. and dropped to *c.* 13.16 m at the point where the culvert passed under the cloister wall.

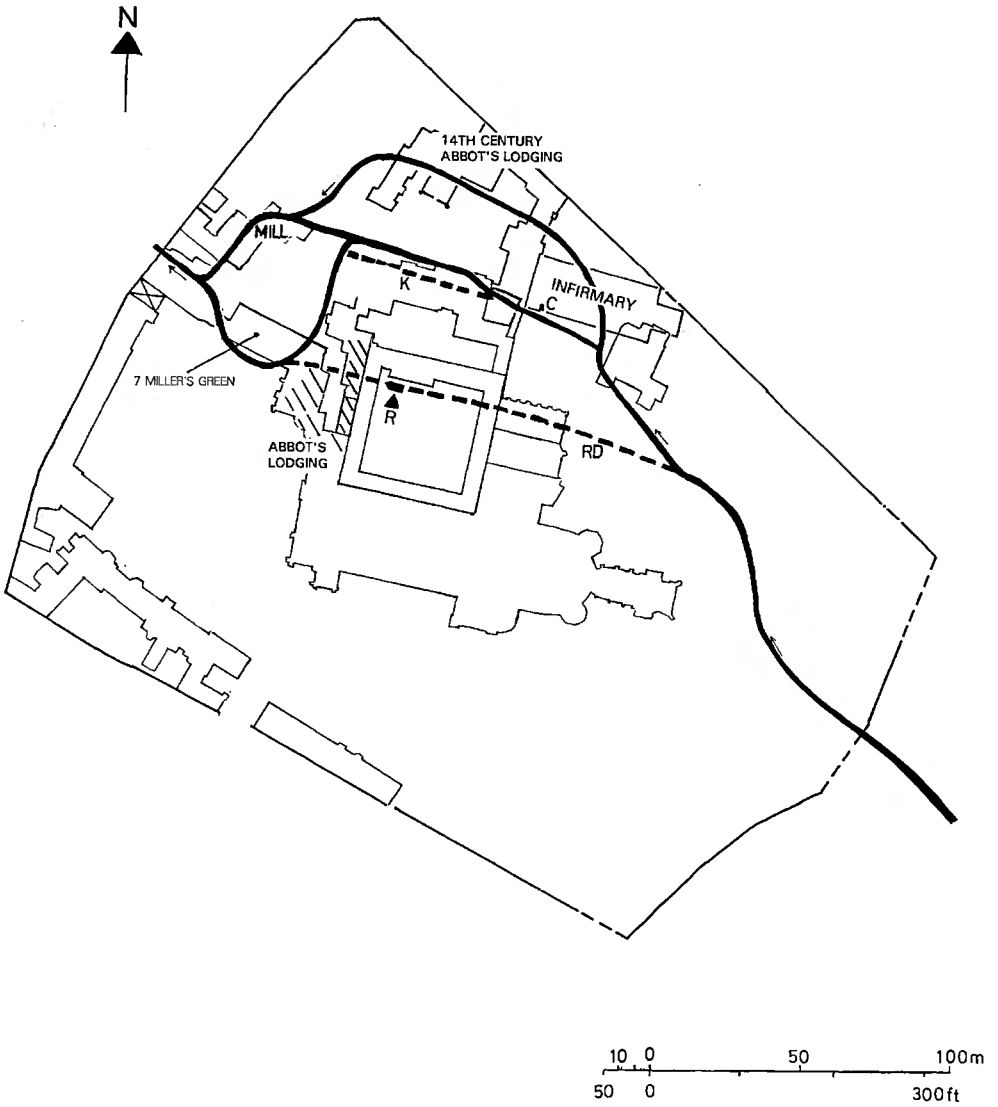

Fig. 1. Plan of the abbey precinct with watercourses as drawn by St. John Hope. C = possible culvert; K = kitchen; R = medieval tank; and RD = reredorter. Shading indicates the probable location of the abbot's lodgings in the 12th and 13th centuries.

At the east end of the tank was a culvert entrance, blocked probably during the Victorian restoration, and, in the lowest course of the east wall, a sub-circular hole which might have once provided the entry of a water pipe (Figs. 3 and 8). The whole tank is spanned by four stone ribs springing from its sides; there were sockets for two further ribs, one at each end, making a total of six. The ribs were designed to support a cover, perhaps of stone slabs, and with these in position the tank would have been invisible, taking medieval ground level to be roughly the level of the threshold of the cloister doorway.

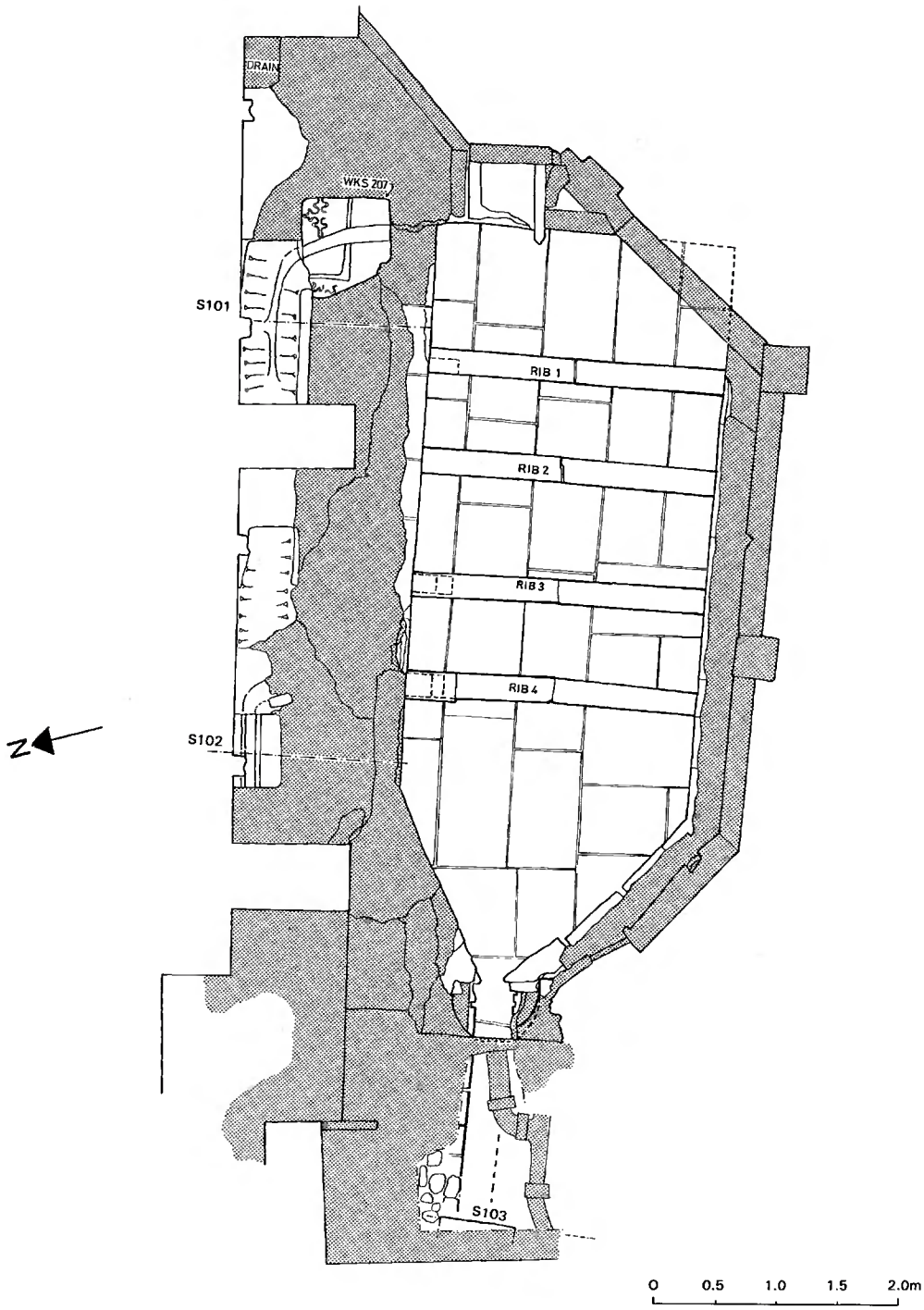

Fig. 2. Plan of the medieval tank. Shaded areas are Victorian repairs in stone or concrete; cross-hatching indicates Victorian plaster repairs.

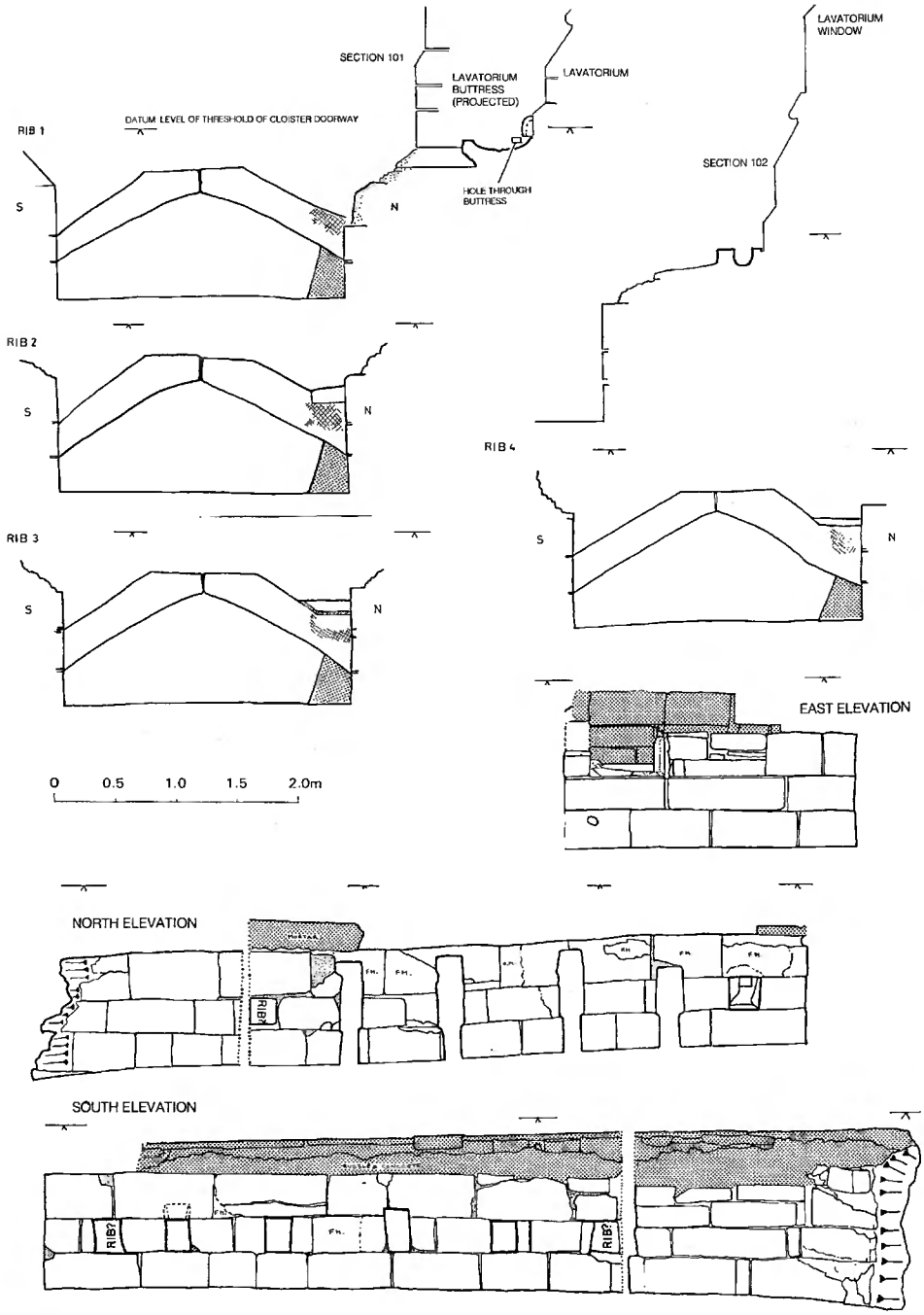

Fig. 3. Sections of the medieval tank. FM = face missing. Shaded areas are Victorian concrete or stone repairs; cross-hatching indicates Victorian plaster repairs. The datum points are all at 14.85 m above O.D.

Fig. 4. General view of the tank to north-east from cloister roof.

The angle of the tank's side walls was achieved on the south by a straight joint in the masonry (Fig. 5). The equivalent effect on the north was provided by the use of deliberately angled ashlars (Fig. 4), indicating that on that side at least the funnelling of the tank was part of the original design. The sluice at the west end (Fig. 6) had been destroyed almost to the level of the base slabs, but it clearly had two paddles, one behind the other (Fig. 7).

Between the tank and the 14th-century lavatorium were the remains of drainage channels which once led waste water from the lavatorium into the tank. The drain spouts from the lavatorium emptied into stone channels along the lavatorium walls, and holes had been bored through the lavatorium buttresses so that water could pass through from one drain to the next (Fig. 3, section 101; Fig. 9). A further stone channel then took the water to the tank. Part of this channel cut through a grave slab decorated with a foliated cross (Fig. 2, WKS 207) and showing signs of having once been used as the base of a container with upright sides, perhaps a cistern.

It was apparent that extensive repairs had been made to the tank, presumably in the late 1880s. The Victorians built up the tank's sides with new ashlars to form one level and bridged its south-east corner presumably to form a safer path. Stone props were placed under the ribs along the north side and much of the stonework was pointed with concrete. The ground surface around the tank was covered with concrete, leaving the surviving medieval stone channels in place. The culvert entry at the eastern end was rebuilt with new stone, and a pre-existing blocking was repaired or the culvert was newly blocked to make a neat appearance. The western semi-circular shaft was re-formed in concrete and provided with a metal grille at the base; the grille

Fig. 5. View of the west end of the tank showing the funnel sluice and concrete 'shaft'.

fed into a stoneware pipe which led out under the cloister wall, destroying part of the medieval culvert. A branch stoneware pipe fed in water from downpipes around the cloister.

When the tank was discovered in the 1880s it was drawn by the cathedral architect, F.S. Waller. His coloured drawing was reproduced as a line drawing by Massé (1898, 111) but otherwise it was unpublished (Gloucester Cathedral Library 3/18). Waller appears to have thought the tank to be a new discovery; however it may have been known in 1791 when the 'cistern' in the cloister garth was cleaned out (Glos. R.O., D 936/A 1/9: reference supplied by Mr. A. Price). The datum shown on Waller's drawing is at 14.85 m above O.D., the level of the threshold of the nearby doorway to the cloister. This level must represent the medieval level of the cloister walk and probably also of the medieval garth.

Monastic water supplies

Most monasteries from the 12th century onwards had a water supply not only for drinking and washing but also for flushing drains, filling fish ponds and supplying kitchens and mills (Coppack 1990, 81–99; Welander 1991, 104). Clean water for drinking and washing would always have been separate concerns; stream water could be used to flush latrines and drive mills but only spring or well water would be used for drinking and washing.

The arrangements for obtaining clean water could be extraordinarily elaborate. At Christchurch, Canterbury, in the mid 12th century water was piped from a spring, passed through five settling tanks, and was piped to the great laver in the cloister, from where it was distributed

Fig. 6. View to west of the sluice with the Victorian grille beyond; the concrete manhole above the grille was the repair of 1996. The Victorian 'shaft' is left of the grille.

about the monastery. At Durham in the 12th century a circular laver was fed by way of a lead pipe in a stone channel. This was replaced in the 13th century by an octagonal laver with brass spouts and taps (Coppack 1990, 86–9).

Gloucester Abbey water supply and associated works

At Gloucester, the Fullbrook stream was diverted through the abbey precinct in the early 12th century not long after the rebuilding of the abbey by Abbot Serlo (Hart, i, 78). The Fullbrook

Fig. 7. View of the sluice from above, north is to left.

had already skirted the inner north wall of the town past populated urban areas. By the time it reached the abbey it cannot possibly have been clean. The purpose of the stream's diversion must have been to take away waste, flush the drains, and drive the mills and not to provide drinking water (Fullbrook-Leggatt 1968, 111). The Fullbrook flowed in a stone culvert, a section of which was observed in 1983 (Heighway 1988, 36). The culvert was 0.8 m high and *c.* 0.7 m wide. The route of this main culvert and some subsidiary watercourses was worked out by W. St. John Hope (Hope 1897, 130 and plan: cf. Fig. 1; Welander 1991, 105), though it is not clear on what he based his conclusions.

The drinking supply of the Norman abbey must have been provided by wells. One of these would be expected in the cloister garth, where a stone well shaft with a Victorian surround can still be seen today. There must have been others, medieval and post-medieval; wells were used until the late 19th century. One in the abbey precinct was mentioned in the late 11th century (Peile 1934, 55) and one, in brick, has been discovered 7.4 m south of the south transept (Heighway 1999, record no. 68).

As far as is known, the abbey did not receive a piped supply of drinking water until the early 13th century, when Ellis of Hereford, abbey sacrist 1227–37, constructed a 'conduit (*conductum*) of living water' (Hart, i, 28). A *conductum* could mean either a conduit or a pipeline, but the phrase 'living water' implies fresh spring water. Late 13th-century grants of water from Robins Wood Hill (Kirby 1967, 8; Fullbrook-Leggatt 1968, 114, 117–18, where the date 1263–84 is given incorrectly as 1163–84) mention that structures for the collection of water had already been built on the hill. It is therefore very likely that Ellis installed the system of lead waterpipes

Fig. 8. View of the tank's east wall showing the culvert entrance and the hole in the lowest course.

which provided fresh drinking water from the hill and was still in use in the 17th century (Eward 1985, 25). No sign has been found of this pipe network, although it is known that some of the Victorian supply runs in lead pipes. Most of the medieval piping may have been dug up and sold for its scrap value.

At Gloucester the lavatorium in the north walk of the cloister was built with the cloister in the period 1381–1400. It projects 2.4 m into the garth and is entered from the cloister walk by eight tall arches with glazed openings above. Internally it is 14.3 m long and has eight two-light windows towards the garth and similar windows at each end. One light of the east window has a small square opening below, perhaps for the entry of the lead pipe bringing the water supply. The washing place consisted of a broad shelf against the wall on which once stood a lead tank with taps to provide the water. In front of the shelf was a shallow stone trough, originally lined with lead, at which the monks washed their hands and faces (Welander 1991, 231, 319). The waste water drained into the garth and was led by stone channels into the stone tank.

There must have been a lavatorium in the 13th century to receive the fresh water organised by Ellis the sacrist. Nothing whatsoever is known about this, except for a tantalising reference by St. John Hope (1897, 129), who states that there was a 13th-century laver

> and some remains of it were found a few years ago in lowering the cloister garth. From these pieces the conduit seems to have been placed above a lavatory, the bason of which was multifoil in plan.

Hope adds that these remains would have closely resembled those at Durham with a circular marble laver with brass taps. There is no other mention of such a discovery and there is no sign

Fig. 9. View to north of the drain from the lavatorium; the re-used grave slab (WKS 207) is in the foreground.

of any such items in the cathedral's stone collection. If Hope was correct in deducing a multifoil basin, such a basin might have occupied part of the cloister garth—perhaps near the well, which is not in the centre of the garth. Excavations at the centre of the garth in 1996 (Heighway 1999, record no. 30) showed no evidence of a central structure, but the investigation was not extensive enough to confirm its absence.

The date and function of the cloister garth tank

The 14th-century cloister was on roughly the same plan as the earlier cloisters. The 12th-century layout is deducible from the plan of the surviving chapter house and east and west slypes; the door leading to the infirmary and little cloister retains, hidden behind its 14th-century jambs, the 13th-century jambs of the earlier cloister. The tank's position therefore bears the same relation to the cloister layout in the 12th and 13th centuries as it does today.

The use of the tank as a drain sump for the 14th-century lavatorium cannot have been the sole original purpose for such an elaborate structure. The exit culvert, which is evidently the same date as the tank, passes under the foundation of the cloister walk. The drain does not appear to have been inserted by boring under the foundation; the tank and its western drain could date to the 12th or 13th century. The Victorian concrete obscured the relationship between the tank and the lavatorium, but the levels (see e.g. Fig. 3, section 101) and the fact that the tank is not aligned on the cloister both suggest that the tank already existed when the

lavatorium was built and that the tank was simply adopted in the 14th century as a drain sump. F.W. Waller, who had the benefit of the original discovery, thought it 13th-century (*Trans. B.G.A.S.* **13**, 48).

Perhaps the tank was intended to store water for use in the earlier lavatorium. The provision of stone ribs to support a cover could suggest care was being taken to keep the water supply clean. If this was the case, however, the entry of a culvert at the east end is puzzling. This culvert leads from the reredorter (Fig. 1) and is therefore very unlikely to have carried clean water (unless it was separate from the reredorter drains). However, the culvert entry (Fig. 2) could be a later addition to the system. It is possible that the original supply was to the tank along a lead pipe, which might have entered through the hole noted just below the culvert; or perhaps the eastern culvert did not lead from the reredorter at all but was part of a complex of channels taking rainwater to the tank. In either case the whole tank could have acted as a covered cistern (for water for washing or cooking and presumably not for drinking) and (when the sluice was closed) as a settling tank with water flowing out over the sluice gate.

If the tank was used for water storage it is not clear how water would have been extracted. Perhaps there was a removable hatch in the cover through which water could be drawn in buckets to be put in tanks for use in the lavatorium and elsewhere. It should be remarked that the tank, though well-built of ashlar, would not have been watertight and would have needed to be topped up by a constant flow of water. It is possible, therefore, that if it was used for water collection it would have been lined in lead.

Another use is suggested by the tank's curious shape, which is funnelled at the west (exit) end. When the tank was full and the sluice was opened a strong head of water would be provided to clean the drains. Flushing systems and latrines were often very elaborate structures (Bond 1989, 91–7; Coppack 1990, 97–9). The question is why there would be a flushing-tank in such a position. The monastic reredorter at Gloucester is to the east of the cloister, upstream as it were, and a flushing system on the site of the tank would be of use only to a latrine or latrines in the west range of the cloister.

Not much is known of Gloucester's west claustral range. In medieval times its buildings included a western range (Church House) and an eastern range (demolished). The eastern range, excavated in 1980, existed from the 12th century and probably had stone foundations (Garrod and Heighway 1984, 53). It was part of the deanery in 1649, though then used mostly as stables (Glos. R.O., D 936/E 1, pp. 267–9). To the south is a 12th-century block with a 13th-century western addition, all much altered in the post-medieval period; it includes the 12th-century abbot's chapel. The east and south blocks in the 12th century, and the west block at least from the 13th century, were part of the abbot's lodgings. In the 14th century new abbot's lodgings were built in the north of the precinct and his old premises were allocated to the prior and, after the Dissolution, to the dean. The abbot's lodgings would have been used for high-status guests as well as for the abbot himself. Further west, on the site of number 7 Miller's Green, was the probable site of the 13th-century guest hall; it included the stone base of the building now called the Parliament Room.[1] The water channel from the water tank in the cloister probably flowed under this guest hall; a watercourse here was mentioned in 1649 (Glos. R.O., D 936/E 1, p. 281).

The courtyard and ground level of the west range are more than a metre lower than the level inside the cloister. A feeder tank at the higher level in the cloister would therefore give strong water pressure. The tank may have been built either in the 12th century, as part of the water arrangements for the new abbey, or in the 13th when the cloister was refurbished and the stone guest hall built. Although it may have had a secondary use as a rain-water collection tank, it was

probably originally intended as a flushing system for the drains in the abbatial and guest quarter of the west range.

Acknowledgements

Wayne Loughlin, of Gloucester Archaeology Unit, carried out the original survey on which Figs. 2 and 3 are based. Alan Norton, clerk of works at the cathedral, took the photographs. Lowinger Maddison, cathedral librarian, advised on abbey leases.

Note

1 A study of this complex of buildings is being carried out by Rochelle Rowell as part of a Ph.D thesis at York University. In the 17th century the building on the site of number 7 Miller's Green consisted of a great timber building in a poor state of repair known as the Old Workhouse, Old Schoolhousc, and once Parliament House (Glos. R.O., D 936/E 1, pp. 281. 274).

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THE MARTYRDOM OF ST. ERASMUS AND OTHER LOST WALL PAINTINGS FROM HOLY ROOD CHURCH, AMPNEY CRUCIS

Introduction

Holy Rood church at Ampney Crucis exhibits a building history from the Saxon period to the 19th century (Verey 1970, 86). Its interior is graced in the north transept by a fine group of wall paintings of late 13th-century date, i.e. soon after—if not actually contemporary with—the completion of this part, and indeed of much of the remainder of the church. A series of