

Privy Garden Collapse

Hampton Court Palace



Archaeological Evaluation Report

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Archaeological Evaluation Report

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with contributions from John Cotter and Alison Kelly and illustrated by Georgina Slater

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Summary

In December 2009, Oxford Archaeology were commissioned by Cathedral Works Organisation (CWO), acting on behalf of Historic Royal Palaces (HRP), to undertake an archaeological excavation in The Privy Garden, Hampton Court Palace. Following the appearance of a hole in the top of a raised walkway along the eastern edge of the garden, subsequent investigation by CCTV appeared to show that the subsidence was due to the failure of a linear arched structure built against the west side of the walkway's retaining wall. The principal aim of the excavation was to ascertain the nature of the arched structure, and to define the extent of the failure in order to facilitate its repair by CWO.

A single trench was excavated, centred on the void created by the collapse. The excavation revealed a series of landscaping deposits within the raised walkway, which were cut by the construction trench for a large brick built culvert. The material in the landscaping deposits gives them a late 17th to early 18th century date. The top of the culvert had been crudely mortared to the western face of the stepped footing of the retaining wall, and thus clearly post-dated that wall.

The lowermost landscaping deposits may be the upper infill of the Tudor moat, which was filled when William III expanded and relaid the garden. If, as seems reasonable, the landscaping deposits date from William's first stage of works to the garden in the 1690s, it is probable that the culvert dates to the radical lowering and re-laying of the garden after June 1701, to allow a clear view of the river from the King's Apartments.

1 INTRODUCTION

1.1 Location and scope of work

- 1.1.1 Oxford Archaeology (OA) were contracted by Cathedral Works Organisation (CWO), on behalf of Historic Royal Palaces, to undertake an archaeological excavation at The Privy Garden, Hampton Court Palace.
- 1.1.2 The site is located on the east side of The Privy Garden at Hampton Court Palace (NGR TQ 159 687), on the top of the raised walkway which runs along the eastern edge of the garden.
- 1.1.3 In February 2009 a hole appeared in the top of the raised walkway due to subsidence. Subsequent investigation by CCTV camera appeared to show that the subsidence is due to the failure of a linear arched structure built against the west side of the walkway's retaining wall. The excavation therefore took place in order that the failed part of the arched structure can be defined and repaired by CWO in a safe manner. As the raised walkway is an historic feature of the Privy Garden, the excavation was considered as an archaeological exercise and archaeological data was recorded.
- 1.1.4 It was proposed to excavate a single trench measuring 3.3 m x 6.6 m at top, against the west side of the retaining wall which itself runs on the east side of the raised walkway. Using a combination of stepping and shoring, the trench was excavated to a total depth of c 3 m, with the deepest, shored area of trench measuring 2 m x 4.6 m in area. The trench was later extended by 1m to the south (i.e. to 3.3 m x 7.6 m) in order to extend the deepest shored area to 2m x 7m. The extension exposed a section of the culvert to the south of the collapse, and was undertaken in order to facilitate the repair of the latter.

1.2 Acknowledgements

- 1.2.1 OA are grateful for all the help and support provided by Rob Umney of HRP. We would also like to acknowledge the help received from Andy Bonner of CWO, and particularly the excellent co-operation from the CWO site team which contributed greatly to the smooth completion of a logistically challenging piece of work during a period of severe weather.

1.3 Geology and topography

- 1.3.1 The site lies on the first terrace drift geology of the river Thames, which overlies London Clay at c9m above OD.

1.4 Archaeological and historical background

- 1.4.1 The history of the development of Hampton Court Palace is well documented (Thurley, 2003). The following section gives a brief summary of some of the more salient information with regard to the development of the Privy Garden.

The Tudor Privy Garden

- 1.4.2 The following summary of the history of the Palace gardens is reproduced from Thurley, 2003 with additional information from the Hampton Court Palace website (<http://www.hrp.org.uk/HamptonCourtPalace/>):

- 1.4.3 By the mid-sixteenth century there were Privy (private) Gardens at all the main royal palaces to provide the Sovereign with security and privacy away from the affairs of State.
- 1.4.4 The first Privy Garden at Hampton Court Palace was laid out between 1530 and 1538 for King Henry VIII. The garden covered an area of just over 61m x 91m and was split into two areas. One of these contained brass sundials and numerous statues of heraldic beasts on poles. The other contained a bowling alley, a magnificent domed banqueting house and the Water Gallery which provided a landing stage from the Thames.
- 1.4.5 The German, Thomas Platter, who was shown the Privy Garden towards the end of Elizabeth I's reign in 1599, described his impressions of the topiary:
- 'There were all manner of shapes, men and women, centaurs, sirens, serving maids with baskets, French lilies and delicate crenellations...trimmed and arranged picture-wise that their equal would be difficult to find.'*
- 1.4.6 Between 1599 and 1659 the layout of the garden was changed from the elaborate heraldic Tudor garden to four grass plats containing fine statuary.

William III's garden

- 1.4.7 In 1689 William and Mary began to rebuild Henry VIII's royal lodgings in the more fashionable Baroque style of the continental courts. Raised terraces were built around the parterre of the Privy Garden and the plain grass plats were cut into forms known as gazon coupé - intricate patterns cut into the turf with a background of sand or gravel.
- 1.4.8 By 1700 the rebuilding of the King's and Queen's Apartments was complete. The Tudor water gallery was demolished and the Privy Garden was lengthened to its present size, covering an area of three acres. A wrought iron screen designed by Jean Tijou was constructed at the south end and clipped yews were placed on the east and west terraces. The gazon coupé was laid out to a more sophisticated broderie design and pyramidal yews and clipped round-headed hollies were incorporated.
- 1.4.9 The elaborate parterre of William III's time survived with minor alterations until the mid-eighteenth century. The changing fashion, however, turned against the controlled formality of the Baroque garden and William's garden became less formal. The yews and hollies were retained but were no longer clipped into shape and the statuary was removed.
- 1.4.10 By the mid-nineteenth century, William and Mary's broderie had completely disappeared under the spreading canopy of trees, providing an informal and shady haven for visitors, rather than a private retreat for a king.
- 1.4.11 Much of the original layout of the Privy Garden was revealed through a combination of archaeological and historical research during the 1995 restoration, which returned William III's garden to its 1702 state. Historical accuracy governed the design of the garden, from the elaborate broderie to the very flowers and shrubs which once grew there. The Privy garden contains 33,000 box plants, topiary and Queen Mary's Bower that survives from an earlier Privy Garden by William III and Mary II.
- 1.4.12 The Privy Garden was re-opened to the public on 6th July 1995 by HRH the Prince of Wales, after four years of detailed research and restoration.
- 1.4.13 The following additional information is predominantly taken from Batey and Woudstra (1995) and from Thurley 1995:

- 1.4.14 The Privy Garden had at first a simple *gazon coupe* English parterre. This means it was basically grass with shapes cut out of the turf and filled with coloured gravels, as seen on the engraving by Sutton Nicholls. King Henry's mount had been partially demolished and terraces raised to the east and west for viewing platforms. Queen Mary was temporarily housed in the Water Gallery, where *"the special Delftware closet...contained, according to Defoe, 'a vast stock of fine china ware, the like whereof was not then to be seen in England'"*. Delft is one of several antiquarian names for what is technically tin-glazed earthenware (also faience, maiolica). The only real Delft is that from Delft in Holland. The indigenous English version is generally (but not always) of slightly lesser quality than the Dutch material - but sometimes it's impossible to tell the difference. In the late 16th English tin glazed earthenware would have been fairly high status in terms of pottery - but by the 18C it was a widespread middle-class ware - often a cheaper substitute for metalware and Chinese porcelain - which it often imitates (John Cotter pers. comm.).
- 1.4.15 It was intended that the Water Gallery would be removed when Wren's palace was finished, so that the Privy Garden could be extended and replanned. It had already been widened to match the new south facade of the enlarged palace, where the King's Apartments were being built.
- 1.4.16 The laying out of the Privy Garden had been by no means straight forward for all those concerned, owing to the King's indecision about his requirements once the garden was doubled in size and the Water Gallery removed. A major factor in the new design was that William wanted to see the barges on the Thames from the Orangery. The garden was lowered eight feet and Queen Henrietta Maria's great Arthusa fountain by Le Suer, which Cromwell had had removed to the Privy Garden from Somerset House, was dismantled. Henry Wise had laid down a first parterre in the Privy Garden when, in the spring of 1701, he and William Talman, the architect, were required to prepare new designs and a wooden model of the garden to show the King. The beautiful grey wrought-iron screens, made by Jean Tijou, and originally intended for the Great Fountain Garden, were put up at the end of the Privy Garden to see the effect. The King decided the ground would have to be lowered even further to achieve a view of the river through the screens and so Wise's first parterre had to be scrapped. Wise immediately undertook to reduce the levels further and to lay out the new parterres.

Contemporary sources

- 1.4.17 A number of drawings and plans survive which show views of the different configurations of the gardens. A summary of some of the features relevant to the recent excavation is presented below:
- 1.4.18 In addition to the domed banqueting house and water gallery mentioned above (1.3.3), a view from the south by Anthonis van Wyngaerde in 1558 shows two towers projecting outwards (i.e. to the east) from the eastern wall of the Privy Garden. The base of at least one of these towers was excavated during the archaeological work in the garden in the 1990s (Thurley, 2003, p90, Fig. 89). These towers were thought to serve as garden viewing platforms to the west, and a standing for observing the hunting in the park to the east (Batey and Woudstra, 1995). Anecdotal evidence from members of staff at the palace suggested that the structural remains excavated in the 1990s were relatively close to the surface.
- 1.4.19 Sutton Nicholls' engraving of 1696 shows the walkways to the east and west of the garden as comprising a single, relatively shallow and modest terrace - particularly in

comparison to the drawing of the finished garden by Leonard Knyff in 1702. This shows the walkways as comprising two terraces and appearing considerably more substantial.

2 EVALUATION AIMS AND METHODOLOGY

2.1 Aims

- 2.1.1 Whilst the primary aim of the excavation was to reveal the extent of the failed culvert, the trench was excavated in stratigraphic sequence in order to characterise the archaeological nature of the deposits. General aims were:
- (i) To determine or confirm the general nature of any remains present.
 - (ii) To determine or confirm the approximate date or date range of any remains, by means of artefactual or other evidence.

2.2 Methodology

Upper 1 to 1.2 m. (the Upper Dig)

- 2.2.1 The gravel covering was excavated and stored tidily on plastic sheeting against the retaining wall and to the south of the trench, approximately 5 m away from the trench edge. This is the only material that was stored near the retaining wall on the east side of the walkway, in order to prevent undue loading above the failed arch structure.
- 2.2.2 A hand excavated trench with vertical sides measuring 3.3 m at right angles to the wall and 6.6 m parallel to the wall was set out with the collapsed hole centred within the excavation. This trench was hand-excavated with shovels, picks and mattocks, and spoil was transported away from the trench using wheelbarrows.
- 2.2.3 Spoil was stored on plastic sheeting on the west side of the walk, away from the retaining wall. Spoil heaps were covered with plastic sheeting to prevent them from becoming waterlogged.

First lower dig (to c 1.2 m)

- 2.2.4 An area measuring 2 m perpendicular to the wall and 4 m parallel to the wall was set out against the west face of the wall and centred between the north and south faces of the upper dig.
- 2.2.5 This lower dig was hand-excavated to a depth of around 0.40 m from the base of the upper dig, so to a total depth of around 1.20 m from surface.
- 2.2.6 The purpose of this lower dig was to define the extent of the damaged area of the arched brick structure. The lower dig was extended c 0.6 m to the north to define the extent of the collapse.

Second lower dig (to c. 4 m)

- 2.2.7 The second lower dig entailed a deepening of all of the first lower dig, and consequently measured 4.6 m x 2 m, as defined by the size of the damaged area of the arched brick structure.
- 2.2.8 The second lower dig was shored using lightweight (ie able to be manhandled) metal trench sheets placed vertically against the north, west and south faces of the dig. Two sets of horizontal timber whalers, one above the other, were installed, bearing against these sheets. The whalers ran around all four sides of the trench, and there were additional central whalers crossing the trench at the midpoints of the long sides. On the east side of the trench the shoring bore against the offset face of the retaining wall.

- 2.2.9 The purpose of the second lower dig was to expose the failed section of the brick arched structure and to allow access to this section by CWO/HRP for examination and repair work.

Southern Extension

- 2.2.10 The trench was later extended by 1m to the south (i.e. 3.3 m x 7.6 m) in order to extend the the deepest shored area to 2m x 7m. The extension exposed a section of the culvert to the south of the collapse, and was undertaken in order to facilitate the repair of the latter.

3 RESULTS

3.1 Introduction and presentation of results

- 3.1.1 Detailed context descriptions are presented in the context inventory (Appendix A), and within the descriptive text in Section 3.3 where they are integral to the interpretation of the context in question.
- 3.1.2 Finds reports are presented in Section 3.4. A discussion and interpretation of this evidence can be found in Section 4.

3.2 General soils and ground conditions

- 3.2.1 Soils at the base of the sequence through which the construction cut for the culvert had been excavated were heavily waterlogged (e.g. deposit 18). The remaining deposits in this sequence comprised dumped demolition material, and were quite loose in places, particularly where there were heavy concentrations of brick rubble. The fills of the construction cut comprised a re-deposition of the material truncated by same, and were consequently also quite loose. The upper part of the sequence was likely to have been deposited in the late 20th century and was very compacted.

3.3 General distribution of archaeological deposits

- 3.3.1 The upper dig comprised a single trench measuring 6.6m x 3.3m which was excavated to approximately 0.8m below ground level (bgl). This was intended to be excavated to 1.2 m bgl, but the presence of live services running from north-south down the middle of the trench necessitated a shallower upper dig, to provide support for the service duct and cable to the north and south of the lower dig. The trench was then stepped in 1.3m to measure 4m x 2m. The top of the culvert was revealed at approximately 1.2m bgl, and the northern end of the smaller trench was extended approximately 0.6m to reveal the extent of the collapse. Consequently, a 4.6m x 2m trench was excavated to the base of the culvert, which was encountered at 3.00m bgl (c7.90m OD). The deposits to the west (i.e. outside) the culvert were excavated to 2.75m bgl (c8.15m OD), and are described below.
- 3.3.2 The earliest deposit, encountered at approximately 8.50m OD, comprised a friable reddish brown sand with little or no variation in composition (18), but with clay pipe throughout. The sterility of this deposit compared with the overlying rubble rich layers (see below), suggested that it may represent a buried soil horizon pre-dating the creation of the existing terrace. This horizon was overlain by a series of deposits (19, 12, 11, 10, 9 and 8) which contained re-deposited 16th century building materials (Sections 3.4.6-10; Appendix C, Table 3), together with 17th century clay pipe and other later artefactual material. It seems likely that these deposits are associated with the landscaping undertaken in the later part of the 17th century or very early 18th century, and that the building material originated from the demolition of elements of the Tudor palace. It is possible that deposit(s) 11/12 - which were comprised almost exclusively of brick/tile and mortar - represent a rudimentary revetment along the eastern face of the mound.
- 3.3.3 These deposits were truncated by the construction cut (7) for the brick culvert (17). The cut was backfilled by a series of deposits, predominantly originating from the re-deposition of the material through which the construction trench cut. The culvert itself was constructed in a stretcher bond with a double skin of brick and a brick base. The bricks are tentatively identified as Type G in the Hampton Court Typology (Ford 1991),

dating to the late 17th or early 18th century, see Appendix 3, Table 3. To the north of the trench, the culvert had been rebuilt using modern brick ("MARSTON BESERES 32"), with a *in-situ* formwork comprising a corrugated tin lining. The inner skin of the collapsed part of the culvert appeared to be overlain by a very fine sandy silt deposit, which was in turn overlain by the collapse of the outer skin. This would suggest that the inner skin of the culvert had collapsed prior to the recent failure.

- 3.3.4 At the southern end of the raised walkway, the boundary wall has two offsets on its west side. Within the trench, only the uppermost of these offsets was present, and stepped out approximately 0.6 m at 1.1 m from the top of the wall. The top of the brick culvert corresponded to the top of the lower offset observed to the south of the walkway.
- 3.3.5 The upper fill (5) of the construction cut, and the uppermost of the landscaping deposits (8), were overlain by a very compacted gravel rich deposit (2) which contained modern material and was overlain by the existing gravel surfacing (1). Deposit 5 was also cut by a north south aligned service trench (4), containing a ducted fibre-optic security cable and an electricity cable. The fill of this (3) was similar to the overlying deposit (2), which suggested that the latter was deposited at the same time that the services were installed.

Southern Extension

- 3.3.6 The southern extension to the trench was undertaken in order to facilitate the repair of the collapsed section of culvert. This exposed a section of the culvert to the south of the collapse which, although damaged, was still intact. Although the deposits excavated during the southern extension correlated with those removed during the initial excavation, a hand-augered borehole through the unexcavated deposits to the west of the culvert provided further information with regard to the interpretation of these deposits, as did a topographical survey of the terraces and garden interior.
- 3.3.7 The borehole revealed that the sterile sandy deposit at the base of the sequence continued for a further 1.30-1.40 m - albeit with a slightly clayier composition towards the base - before an obstruction was encountered which may have been the terrace gravels.

3.4 Finds summary

see Appendix C

Pottery by John Cotter

Introduction and methodology

- 3.4.1 A total of 38 sherds of pottery weighing 254 g. were recovered from four contexts. All of this is of post-medieval date apart from a single medieval sherd. All the pottery was examined and spot-dated during the present assessment stage. For each context the total pottery sherd count and weight were recorded on an Excel spreadsheet, followed by the context spot-date which is the date-bracket during which the latest pottery types in the context are estimated to have been produced or were in general circulation. Comments on the presence of datable types were also recorded, usually with mention of vessel form (jugs, bowls etc.) and any other attributes worthy of note (eg. decoration etc.).

Date and nature of the assemblage

- 3.4.2 This small pottery assemblage is in a fairly fresh but fragmentary condition. Normal domestic pottery types are represented. Three of the four contexts contain pottery dating to c 1675-1750. Context (2), in addition, produced a single residual sherd of medieval Surrey whiteware of 13th-15th century date. Context (5) produced a single 16th-century sherd (but also later clay pipe). Fuller descriptions of the pottery may be found in the spreadsheet catalogue.

Recommendations

- 3.4.3 The assemblage is small and contains no previously unrecorded types from the palace. No further work on it is recommended.

Clay Tobacco Pipes by John Cotter***Introduction***

- 3.4.4 The excavation produced a total of 136 pieces of clay pipe weighing 748 g. These have been catalogued and recorded on an Excel spreadsheet in a similar way to the pottery. The catalogue records, per context, the spot-date, the quantity of stem, bowl and mouth fragments, the overall sherd count, weight, and comments on condition and any makers' marks or decoration present. Oswald's simplified typology (Oswald 1975) has been used to date the pipes.

Date and nature of the assemblage

- 3.4.5 The assemblage is generally in a fairly fresh condition with only slight wear visible on a few pieces. Thirty one pieces of pipe bowls are present including nine complete bowls and several other fairly large bowl pieces. Only one mouthpiece is present. Stem fragments comprise the remainder. Apart from milling on the rims of a few examples, all the pipes are plain with no evidence of makers' marks. The assemblage is clearly dominated by pipe bowls of c 1680-1710 and it is likely that all the pipe-bearing contexts date to around this period - even those dated only by pipe stems. At least one residual pipe bowl of c 1640-1670 is also present (context 5), plus one or two larger bored 17th-century stem pieces. The bowls appear to have been used. A couple of stems have been burnt post-deposition, probably in a bonfire or fireplace. The material generally has the character of ordinary domestic rubbish. Aside from these observations the assemblage is not particularly remarkable.

CBM (Brick) by Alison Kelly***Introduction***

- 3.4.6 The excavation produced a mixed assemblage of fragmented and whole bricks. Due to the nature of the finds only the larger fragments and whole samples were examined in any detail and these are listed on the table presented within Appendix C. The bricks were examined for identifiable details (inclusions, colour, mortars etc.) and where possible measurements were taken. All this data was then used to compare the bricks to the Hampton Court Brick Typology by Daphne Ford for English Heritage (1991) and where possible a tentative identification is given.

Date and nature of the assemblage

- 3.4.7 The assemblage was mostly contained within a small number of contexts which were all related to the fill of construction cuts or layering of the terrace. Early Tudor bricks

were recovered from context (5) and (9) with the header measurement of two suggestive of the larger type A bricks used in the pre Wolsey and Early Wolsey construction phases. A further Tudor brick (possibly Type B) was recovered from context (14) together with a fragment of brown coloured brick with a shallow defined frog tentatively identified as Type O and dated to the Mid 18th C. A further brick sample from this context was unusual being light brown coloured with many small lime inclusions within the clay, this is probably 18th century in date as the arris was defined, however it does not match any description within the Brick Typology and has not been seen by the author despite much research on the bricks of Hampton Court Palace. Context (21) is a modern brick with the manufacturer stamp 'MARSTON BESPRESS' within the frog removed from a modern repair of the culvert. Bricks from contexts (22) and (23) are both similar in appearance and probably Type G late 17th / early 18thC in date.

Non Ceramic Building Material by Alison Kelly

Introduction

- 3.4.8 The excavation produced 30 fragments of worked stone, some of which was rubble in nature with no worked surfaces. Each piece was examined and any features recorded including the presence of tool marks and type of moulding. Different types of stone were recorded but without specialist lithological knowledge the majority of finds can only be classed as limestone or sandstone. A catalogue of the main pieces of worked stone noted is included within Appendix C.

Date and nature of the assemblage

- 3.4.9 The condition of the stone recovered suggests that several larger pieces were broken up and deposited, probably as fill for construction cuts and terrace deposits. Due to the nature of the finds it is not possible to accurately date any of them. Several Reigate stone fragments were found in contexts where other 16th C building materials were also recovered (5 and 14). These pieces probably date to the same period as although the use of Reigate stone at Hampton Court continued until the late 18th century it was predominantly used in the earlier palace and pre-palace phases of construction. On the fragments of Reigate two had evidence for graffiti which is a fairly common occurrence in building materials from this phase. This suggests these fragments were in situ for a fairly considerable period of time
- 3.4.10 Three fragments of chalk were recovered (14 and 5) and appeared natural in form but were possibly part of an earlier foundation, reused as fill. A fairly large fragment of limestone from context (14) was probably part of a larger piece that had been broken up, the traces of mortar and red brick suggest this was reused - again probably in a foundation.

4 DISCUSSION

4.1 Reliability of field investigation

- 4.1.1 Whilst the coverage of the site area was limited by the brief and by health and safety considerations, a reasonable interpretation of the range and preservation of surviving archaeological deposits can be presented. Although the full stratigraphic sequence was not revealed, the dating evidence from the deposits which were excavated suggests that all the deposits encountered relate to the late 17th century phase of landscaping.

4.2 Evaluation objectives and results

- 4.2.1 The aim of the excavation was to facilitate repair to the failed section of the culvert, as such it was not necessary to excavate the full stratigraphic sequence. Despite this, the deposits and structures revealed within the trench are reasonably well understood within the context of the landscaping of the Privy Garden.

4.3 Interpretation

Landscaping

- 4.3.1 All the deposits encountered within the trench contained late 17th century artefactual material, and are therefore likely to be associated with the landscaping of the garden following the construction of William III's palace. No evidence for the Tudor palace or garden was revealed, with the exception of the redeposited building material within the deposits forming the 17th/18th century terraces.
- 4.3.2 It therefore seems likely that the wall and terrace of the present configuration of the garden lie to the east of the Tudor garden, which would be consistent with the garden having *"already been widened to match the new south facade of the enlarged palace"* (1.3.14). This would also account for the fact that the floor of the Tudor tower excavated in the 1990s was relatively shallow (1.3.17), as it seems likely that it was revealed at the base (i.e. to the west) of the existing terracing.
- 4.3.3 A reconstructed plan based on Wyngaerde's view of the palace and 17th century plans (Thurley, 2003, p90, Fig. 88), show a north-south aligned moat immediately to the east of the mid-16th century eastern wall of the Privy Garden. As the garden was widened during the construction of Wren's palace, it is feasible that the waterlogged deposits at the base of the excavated sequence represent the 17th century backfilling of this moat. The topographical survey confirmed that the level of the present garden interior was 0.15 m above the base of the trench, and 1.55 m above the obstruction encountered within the hand augered borehole. This strongly suggests that the deposits encountered to the west of the culvert are fills of a negative feature, particularly when considering that the level of the garden interior has been significantly lowered (Section 1.3.15).
- 4.3.4 Given the late 17th / early 18th century material recovered, it is therefore possible that the sterile deposits at the base of the sequence do reflect the backfilling of the moat as part of the landscaping of the earlier configuration of the Privy Garden shown on Sutton Nicholl's drawing. Given the relatively sterile composition of the 'backfill' material, it is feasible that these deposits originate from a re-deposition of a naturally deposited fluvial sand, which is possibly a variant of the Ham River Sands/River Brickearths or Alluvial material which characterise the deposits overlying the gravel to the south of the river (BGS Sheet 270). If this is the case, it is probable that the later rubble deposits were part of the landscaping undertaken by Wise in the 1690s following the demolition

of the Water Gallery - presumably the origin of the demolition material present throughout these deposits and possibly of the tin glazed earthenware recovered from Deposit 11 (see Section 1.3.14). It is also possible that the double terrace reflects the two stages of landscaping undertaken by Wise, with the upper terrace representing the spoil from the further lowering of the garden interior following the 1701 re-design.

- 4.3.5 An alternative interpretation of the sterile deposits can be presented, in light of evidence from the analysis of monolith samples taken from Base Court during the recent resurfacing works. The report into this analysis references the unpublished report into the work undertaken during the reconstruction of the Privy Garden, and notes that :

A truncated argillic brown sand [has been] located at the Privy Garden, where there had been natural Holocene pedogenic clay translocation (Avery, 1990; Duchaufour, 1982), [this] was identified using bulk studies and soil micromorphology (Macphail et al., 1995; details in Macphail, R. I. Crowther, J. and Cruise, G. M., 1995(?) unpublished report by Northampton Archaeological Unit). At the Privy Garden, truncation was suggested to have been part of landscaping in relationship to the construction of this garden. (references can be found in OA, 2009(2))

- 4.3.6 The presence of this sandy deposit within the garden interior casts some doubt as to the validity of the interpretation of the deposits to the west of the culvert as filling a negative feature. This interpretation had assumed that the natural geology encountered during the reconstruction work was Terrace Gravel, and that the obstruction at the base of the hand augered borehole also represented the gravel, albeit truncated by the excavation of the moat (subsequently backfilled with the sandy material). However, if the geology within the garden interior comprised 'argillic' sand, then the sandy material within the borehole may have correlated to this deposit, rather than represent backfill.
- 4.3.7 Despite this, the presence of 17th - 18th century artefactual material would still suggest re-deposition, as would the fact that finds were present from at least the top 0.30 m of the deposit. Additionally, it is not clear where the 'argillic' brown sand was encountered during the reconstruction work. A photograph of the site (Thurley, 2003, p395) would suggest that gravel was encountered to the south of the site, with an orangey brown deposit within the deeper of the trenches to the north possibly representing the sandy material, but this is very far from clear. Further analysis of the archive from the reconstruction work would be required to verify either hypothesis.

The Culvert

- 4.3.8 The culvert may have been installed as part of the second phase of late 17th century/early 18th century landscaping (from June 1701 onwards), and was possibly intended to divert water away from the newly lowered garden interior. This would suggest that the culvert must drain into the river to the south. If this is the case, then it would imply that, to the south of the terrace, the culvert is incorporated into the lower offset on the western side of the wall, the top of which corresponds with the top of the culvert within the trench. Alternatively, the culvert must drop dramatically to the south of the trench.
- 4.3.9 However, the interior of the culvert was relatively dry, particularly compared to the saturated deposits to the west of the structure, which may suggest that the culvert was designed to divert moisture away from the footing of the garden wall (13) where the terrace has been constructed against it. This seems feasible if the sterile deposits at

the base of the sequence do represent a backfilled moat, as the deposits here would be susceptible to becoming waterlogged.

- 4.3.10 The crude construction of the culvert, together with the clumsy bonding to the standing wall, implies that it was not intended as part of the original design of the wall. This would suggest that the culvert has been inserted after the construction of the existing wall, and the deposition of the terrace deposits against its western face. However, as the construction cut had removed any evidence for the relationship between the existing wall and the terrace deposits, it is possible that the wall is later than the mound. If this is the case, then the construction cut could actually have been for the wall, with the culvert rapidly constructed against it - possibly as a remedial measure when the potential problem was recognised. However, the historical sources, as discussed by Thurley (2003, 230, 234-5) record an east wall to the garden being built in the 1690s and the lowering of the garden need not have required this wall to be rebuilt. On balance, it seems more likely that the wall remained and the culvert was inserted after June 1701 when the drainage arrangements were undoubtedly changed, with the 1690s culverts being dismantled (*ibid.*, 235)

APPENDIX A. TRENCH DESCRIPTIONS AND CONTEXT INVENTORY

Trench 1						
General description				Orientation		N-S
Post medieval landscaping deposits associated with the construction of the raised walkway along the eastern side of the Privy Garden. These were truncated by the construction cut for a N-S aligned culvert, crudely mortared to the stepped west face of the garden wall.				Avg. depth (m)		2.95
				Width (m)		3.30 stepped to 2.00
				Length (m) following extension		7.60 stepped to 7.00
Contexts						
context no	type	Width (m)	Depth (m)	comment	description	date
1	layer		0.06	gravel path	compact orange brown sand and gravel	
2	layer		0.26	modern made ground	compact mid brown sand and gravel	
3	fill		0.5	backfill of service trench	compact mid brown sand and gravel	
4	cut			service trench		
5	fill		0.8	fill of construction cut for culvert	friable mid brown sand and gravel	
6	fill		0.8	fill of construction cut for culvert	friable mid brown silty sand with 10% white stone dust	
7	cut			construction cut for culvert		
8	layer		0.35	terrace deposit	friable mid brown sand with 10% gravel and 120% brick dust	
9	layer		0.06	terrace deposit	friable red brick dust	
10	layer		0.2	terrace deposit	friable mid brown sand with c50% gravel	
11	layer			terrace deposit	brick and tile rubble	
12	layer		0.4	terrace deposit	friable light brown silty sand with 5% chalky mortar	
13	structure			eastern boundary wall of Privy Garden		
14	fill		0.4	fill of construction cut for culvert	loose light brown sand with c10% brick and 5% mortar	
15	fill		0.25	fill of construction cut for culvert	friable light brown silty sand with 5% mortar lumps	

context no	type	Width (m)	Depth (m)	comment	description	date
16	deposit			timber staining from shoring associated with repair of culvert to north		
17	structure			culvert		
18	deposit			?moat backfill?	friable reddish brown sand with occasional lenses of dark silt	
19	deposit		1	terrace deposit?	friable mid brown sand with c10% mortar lumps and occasional brick	
20	finds ref			finds from collapsed part of culvert - possible contamination from later deposits		
21	finds ref			brick from modern repair		
22	finds ref			brick from outer skin of culvert		
23	finds ref			brick from inner skin of culvert		

APPENDIX B. BIBLIOGRAPHY AND REFERENCES

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APPENDIX C. TABLES

Table 1 - Pottery Spot Dates and Description

Context	Spot-date	No.	Weight	Comments
2	c1675-1750	3	70	1x chamberpot rim Red Border ware, fresh. 1x bs 17C German Frechen stoneware. 1x sl worn bs medieval Surrey whiteware 13-15C, prob from a bowl with int green glaze
5	c1480-1650	1	22	Prob 16C. Guys-type ware with int white slip & clear glaze. Sag base with poss trace of tripod foot. Slight worn
11	c1675-1750	30	63	1 vess, crushed, abraded. Eng tin-glazed earthenware (TGE) deep bowl rim/body sherds with blue-tinted glaze and traces blue painted dec
14	c1675-1750	4	99	1x small frag TGE wall tile. 1x bs Border ware. 1x base German Frechen stoneware bellarmine. 1x bs PMR
TOTAL		38	254	

Table 2 - Clay Tobacco Pipe Spot Dates and Description

Context	Spot-date	Stem	Bowl	Mouth	Tot sherds	Tot Wt	Comments
2	c1680-1710	10	1	0	11	58	Near complete bowl, oval heel. Sl worn
5	c1680-1710	14	3	0	17	86	2x bowls 1680-1710, 1 complete, both oval heels. 1x damaged bowl 1640-70 with short stubby spur. Fairly fresh
9	L17-E18C	4	0	0	4	17	Stem bores c2mm. 1x 17C
14	c1680-1710	52	19	0	71	414	7x complete bowls 1680-1710 w oval or round spurs. Others more fragmentary - but prob same date. Only 2-3 milled. Fairly fresh
15	c1680-1710	10	3	0	13	71	2x damaged bowls 1680-1710 lacking heels. 1 x stubby oval heel. Fairly fresh
18	c1680-1710	9	4	1	14	61	4 smallish frags prob from 1 bowl - prob 1680-1710. Stems L17-E18C, fairly fresh
20	L17-E18C	5	1	0	6	41	1 bowl frag with complete large oval heel, top missing. SBs 2-2.5mm. Fairly fresh
TOTAL		104	31	1	136	748	

Table 3 - Brick Typology and Description
by Alison Kelly

Context	Spot Date	Frag/ Whole?	Size	Colour	Mortar	Notes	Poss Brick Type?
5	Early / mid 16th Century	Frag	(100) x 105 x 57 mm	Rose / orange	friable gritty lime mortar, white with large inclusions	Fragment of unfroged brick. Edges poorly defined. Small mixed inclusions within clay fabric, wrinkled skin. Suggestive of Tudor date.	
5	Early / mid 16th Century		(150) x 110 x 55 mm	Orange	n/a	Fragment of unfroged brick. Edges poorly defined. Small mixed inclusions within clay fabric, wrinkled skin. Suggestive of Tudor date. Appearance and depth of brick consistent with Type A?	A
9	Early / mid 16th Century	Frag	(60) x 110 x 61 mm	Orange	n/a	Fragment of unfroged brick. Edges poorly defined. Small mixed inclusions within clay fabric, wrinkled skin. Suggestive of Tudor date. Appearance and depth of brick consistent with Type A?	A
14	Early / mid 16th Century	Frag	(140) x 105 x 51mm	Rose	n/a	Fragment of unfroged brick. Edges poorly defined. Small mixed inclusions within clay fabric, wrinkled skin. Stone inclusions within fabric. Suggestive of Tudor date.	
14	Mid 18th century	Frag	(140) x 104 x 66mm	Brown	n/a	Fragment of brick with shallow defined frog. Skin is wrinkled and there are strike marks to underside of brick. Material is porous with small stone inclusions.	O
14	18th Century	Frag	(66) x (70) x (55) mm	Yellow	n/a	small fragment of yellow/brown coloured brick with large quantity of small lime flecks within core. Porous material with defined edges. Probably 18thcentury in date	
14	L 17th / E 18th C	Whole	216 x 100 x 60 mm	Dark rose	hard gritty white lime mortar with small mixed inclusions	Unfroged with strike marks. Edges defined, skin wrinkled, upper face has strike marks. Size and description fits with Type G bricks but usual brick colour is more orange.	G
14	E 16th C	Whole	230 x 116 x 49 mm	Red Brown	n/a	Unfroged brick with edges poorly defined. Small mixed inclusions within clay fabric, wrinkled skin. Suggestive of Tudor date.	B
21	Mid / late 20th century	Whole	223 x 105 x 66 mm	Pale Pink	n/a	Whole sample of modern brick with the manufacturer stamp 'MARSTON BESPRESS' within frog. These brick types held in storage and used for non visible repairs until the late 20th century.	
22	L 17th / E 18th C	whole	212 x 97 x 62 mm	Rose	friable gritty lime mortar, white with sml inclusions	Unfroged with strike marks. Edges defined, skin wrinkled, upper face has strike marks. Size and description fits with Type G bricks but usual brick colour is more orange.	G

22	L 17th / E 18th C	whole	214 x 97 x 60mm	dark rose	friable gritty lime mortar, white with sml inclusions	Unfrogged, edges defined, skin wrinkled. Size fits with Type G bricks but usual brick colour is orange.	G
22	L 17th / E 18th C	whole	218 x 101 x 60 mm	Rose	friable gritty lime mortar, white with sml inclusions	Unfrogged, edges less defined, skin wrinkled. Size fits with Type G bricks but usual brick colour is orange.	G
23	L 17th / E 18th C	whole	214 x 97 x 62mm	brownish rose	friable gritty lime mortar, white with sml inclusions	Unfrogged, edges defined, skin wrinkled. Size fits with Type G bricks but usual brick colour is orange.	G

Table 4 - Non Ceramic Building Material
By Alison Kelly

Box No.	Context	Stone type	Moulding?	Identified?	Other Comments
1	5	Reigate Greenstone	-	-	Fragment with small section of worked face and deep score line. Condition suggests this was later broken up for hardcore.
1	5	Chalk	-	-	2 large fragments of chalk possibly used for foundations and later redeposited as fill?
1	5	Reigate Greenstone	Hollow chamfer	Quoin	2 fragment which piece together to form 3 worked faces with shallow hollow chamfer . Worked faces appear worn suggesting fragment was broken and reused as hardcore. There is a score line to what was possibly the inner face.
2	5	Reigate Greenstone	-	Block	fragment with 2 plain worked surfaces. fine finish.
2	11	Slate	-	-	2 fragments of dark grey coloured slate, one with traces of lime mortar on.
2	14	Limestone	-	-	Large fragment of stone with one worked face with curved lip (broken off). one fragmentary face has a creamy lime mortar with red brick traces on suggesting this was later reused in construction, probably as hardcore.
2	14	Reigate Greenstone	-	Block	Fragment of stone with three worked surfaces, two smooth in finish, one with chisel markings. One smooth surface has evidence of graffiti but the inscription is undecipherable.
3	14	Limestone	Hollow chamfer	Jamb?	fragment with 4 work faces, the base of which has many deep claw marks, the remaining faces are finely finished. Exposed faces has scratches/ possible graffiti on. Piece evidently used and then reused as fill.
3	14	Slate	-	-	Fragment of green slate.
3	20	Reigate Greenstone	Roll	-	Small fragment of roll moulding. Many similar pieces recovered from 19thC hardcore layer in Base Court Excavation (2008). Roll appears weathered so poss from external location.

APPENDIX D. SUMMARY OF SITE DETAILS

Site name: Hampton Court Palace, Privy Garden Collapse
Site code: HCP7309
Grid reference: TG 159 687
Type: Evaluation
Date and duration: December 2009, 1 week
Area of site: 6.6m x 3.3m

Summary of results: In December 2009, Oxford Archaeology were commissioned by Cathedral Works Organisation (CWO) to undertake an archaeological excavation in The Privy Garden, Hampton Court Palace. Following the appearance of a hole in the top of a raised walkway along the eastern edge of the garden, subsequent investigation by CCTV appeared to show that the subsidence was due to the failure of a linear arched structure built against the west side of the walkway's retaining wall. The principal aim of the excavation was to ascertain the nature of the arched structure, and to define the extent of the failure in order to facilitate its repair by CWO.

A single trench was excavated, centred on the void created by the collapse. The excavation revealed a series of post-medieval landscaping deposits, which were truncated by the construction cut for a brick built culvert. The top of the culvert had been crudely mortared to the western face of the stepped footing of the retaining wall, and clearly post dated same.

The culvert may have been installed as part of a phase of late 17th century/early 18th century landscaping of the Privy Garden, undertaken by William III prior to his death in 1702.

Location of archive: The archive is currently held at OA, Janus House, Osney Mead, Oxford, OX2 0ES, and will be deposited with **TBC** in due course, under the following accession number: **TBC**

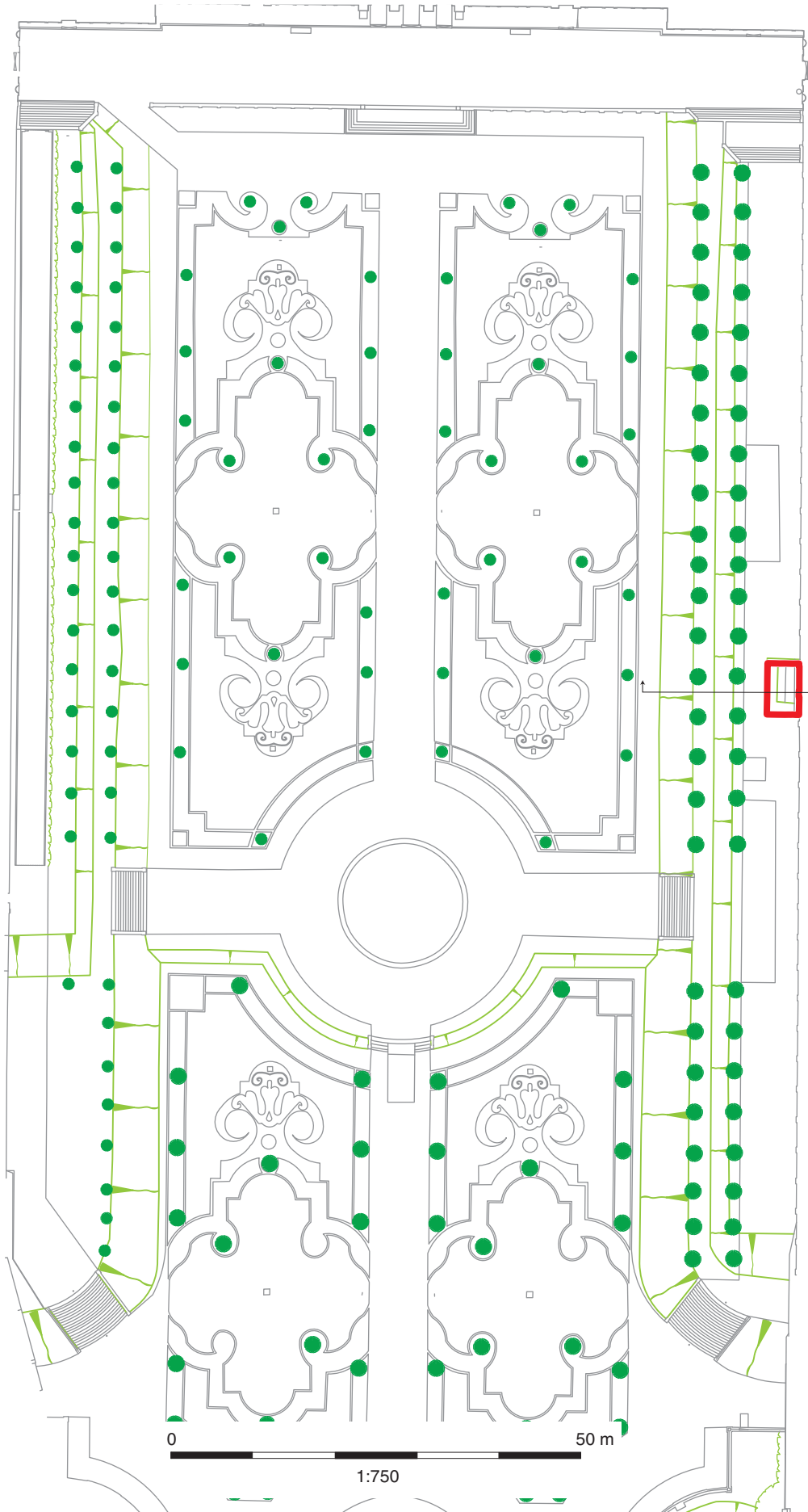
\\Servergo\invoice codes*HCP7309*ICP73EX*PrivyGarden Collapse, Hampton Court Palace*GS*23.04.10



Scale 1:50,000

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Figure 1: Site location



Section 2
Figure 4

Figure 2: Trench location

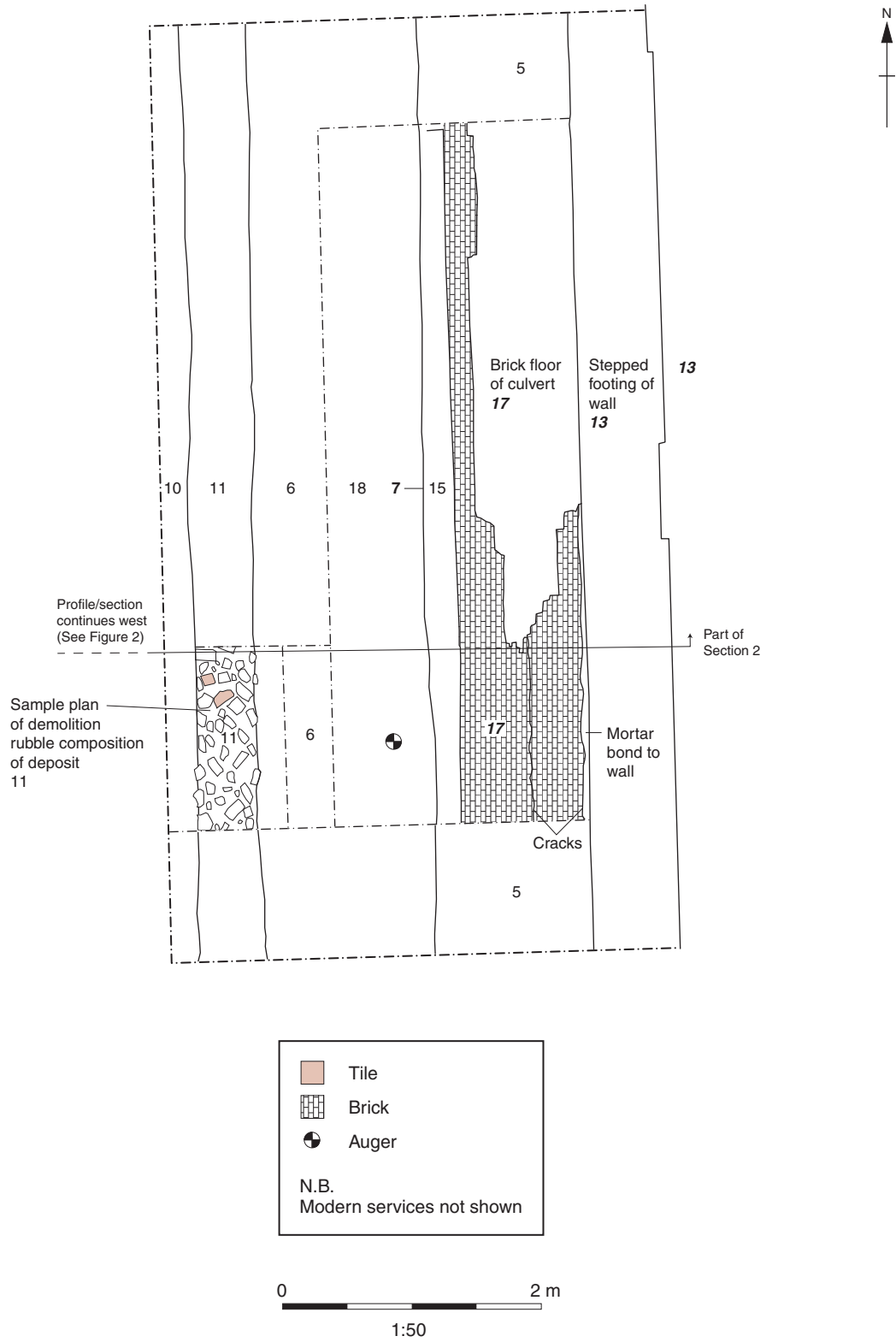


Figure 3: Trench plan

Profile showing topography of garden and stratigraphy in trench

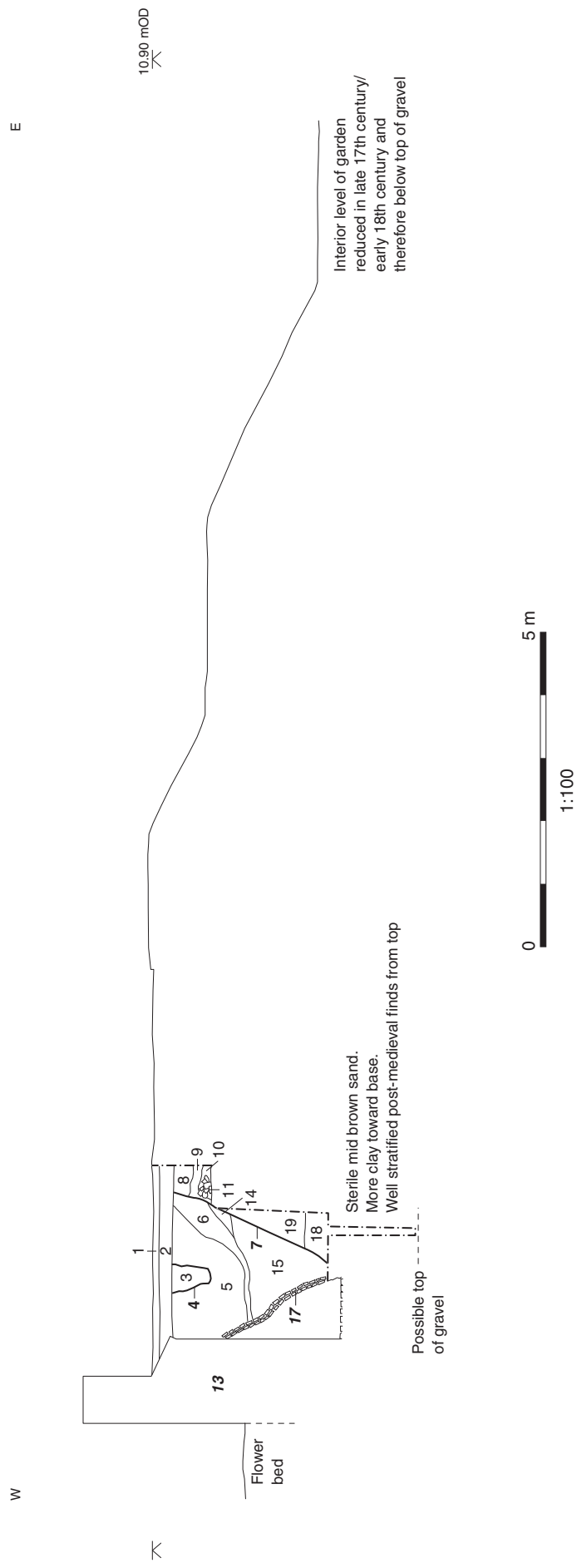


Figure 4: Section 2: Profile showing topography of garden and stratigraphy in trench



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