



WESTMINSTER HALL SOUTH STEPS
Palace of Westminster
London SW1

City of Westminster

An archaeological post-excavation assessment

July 2008



MUSEUM OF LONDON

Archaeology Service

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Site Code: WME06
National Grid Reference: 530210 179520

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Executive summary

This report describes the results of the archaeological excavation and architectural recording programme carried out in 2006 at Westminster Hall in the Palace of Westminster. The archaeological work accompanied an extensive programme of engineering works designed to stabilise the floor of the historic hall.

The excavations discovered fragments of a Purbeck marble table, known as the King's Table, which can be dated on stylistic grounds to the third quarter of the 13th century. These fragments are of national importance. The dating of the table fragments imply that it was either made during the reign of Henry III (1216–1272), possibly for use at his 're-coronation' in 1259, or for the coronation of his son Edward I (1272–1307). Fragments were also found of two later tables, one of limestone made after 1300, the other of Caen stone of late 15th or early 16th century date. The latest fragments may come from a table built for the sumptuous coronation of Henry VIII and Katharine of Aragon in 1509.

The excavations also revealed a full sequence of historic floors in the hall, ranging from the original surface of the 1090s to the concrete and stone floor laid down in the 1830s. Archaeological and geoarchaeological work has enabled an understanding of the causes of the settlement that has long affected the hall: the problem was due to an infilled historic channel located beneath the south end of the hall. Architectural recording has allowed a greater understanding of the reconstruction works carried out by Robert Smirke in the 1830s, Charles Barry in the 1850s and Frank Baines in the early 20th century.

The report is written and structured in a particular way to conform with the standards required of post-excavation archaeological analysis work as set out in *Management of Archaeological Projects* (English Heritage, 1991). Recommendations for publication of the archaeological findings are made in a separate *Updated project design* document that combines this site with the adjacent site in Cromwell Green.

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Introduction

1.1 Site location

The works described within this report took place within Westminster Hall in the Palace of Westminster (Fig 1). The hall was originally built in the late 11th-century. The Ordnance Survey National Grid reference for the approximate centre of the works is 530210 179520. Within this report Westminster Hall is often referred to as 'the site'. The Museum of London archaeological site code is WME06.

1.2 The scope of the project

The project principally consists of archaeological excavations and observations conducted in the hall in 2006 during the consolidation works to the hall's south steps and floor. It should be noted that archaeological works conducted in 2006 in the adjacent Cromwell Green are reported on in a separate *Post-excavation assessment* document. The proposals for publication and dissemination for the two archaeological sites will be treated jointly in a single *Updated project design* document.

1.3 Circumstances and dates of fieldwork

The archaeological fieldwork accompanied a large-scale engineering project designed to find a solution to the problem of long-term, gradual subsidence of the flagstone floor and steps at the south end of Westminster Hall. Previous investigations and interventions to quantify this problem had been made. For example, Ministry of Works' drawings of 1950 record the amount of settlement of the south steps since the 1920s (Ministry of Works, drawing 210/89). In the 1990s, Alan Baxter and Associates investigated and monitored settlement in the hall (Baxter, 1996). In 2005, Gifford Ltd were commissioned by the Parliamentary Estates Directorate to design a long-term engineering solution. Gifford were also able to use their in-house archaeological expertise to ensure that the engineering solution was appropriate in the heritage context of this Grade I listed building and that it had an important archaeological mitigation component.

In 2005 Phil Emery and George Nash of Gifford monitored geotechnical work in the hall by Gifford's subcontractors, which principally consisted of temporarily removing selected flags, taking core samples and carrying out strength testing with penetrometer at ten locations between the south steps and the west steps (with one of the ten samples located at the north end of the hall). These archaeological observations demonstrated the archaeological potential of the deposits beneath the flag floor. Gifford also recorded two small test pits which had been left open from previous work in the cramped area underneath the south steps. A large fragment of medieval moulded stone observed at the base one of these pits was identified by the Estates Archivist Dr Mark Collins, as a further fragment of the medieval King's Table (below, 3.1), first discovered under the steps by Arnold Taylor in 1960. Taylor, Deputy Chief

Inspector of Monuments for the Ministry of Works, recovered enough fragments to reconstruct three-quarters of a trestle support, which, until 2006, was on display in the Jewel Tower. The King's Table, an object of national importance, subsequently became a priority consideration in the development, by Gifford in liaison with MoLAS, of the archaeological mitigation to accompany the engineering works.

In 2006 MoLAS were appointed as the archaeological contractor. The archaeological programme designed by Gifford and MoLAS consisted of, in summary:

- Recording the 1830s flag floor (and the underlying support walls) prior to and during their removal by the stonework contractors.
- Recording the 1850s south steps (and their support walls) prior to and during their removal by the stonework contractors.
- Recording the walls of Westminster Hall where newly exposed by the removal of the 1850s steps.
- Excavating two sample trenches, one under the lantern (and designed, therefore, to find any surviving traces of a putative central hearth) and a second in the area where the King's Table fragments were found.
- Monitoring and archaeologically recording, as appropriate, the piling and other groundworks accompanying the engineering scheme.
- Excavating four or more cores in order to collect palaeoenvironmental samples (from a level below the archaeologically excavated trenches).

The MoLAS programme of archaeological works ran from Wednesday 15th March 2006 to Thursday 4th May. The archaeological works were monitored by Dr Rory O'Donnell and Paddy Elson (Government Historic Estates Unit, English Heritage) and Diane Walls (Greater London Archaeology Advisory Service, English Heritage) on behalf of the local planning authority, the City of Westminster.

1.4 Organisation of the report

Post-excavation assessment is defined in the relevant English Heritage GLAAS guidance paper (Paper VI) as intended to 'sum up what is already known and what further work will be required to reach the goal of a well-argued presentation of the results of recording and analysis' (VI/1).

The principle underlying the concept of post-excavation assessment and updated project design were established by English Heritage in the *Management of Archaeological Projects 2* (MAP2), (1991). More recent GLAAS guidance has emphasised the need for this stage to be seen as 'brief and transitional', the document acting as a 'gateway' to further analysis and eventual publication (EH, GLAAS, 1999 VI/1)

Section 2 of this report describes the archaeological background to the site and lists the original research aims which informed the archaeological investigation. The preliminary results of the work are given in section 3; section 4 quantifies the range of archaeological data recovered from the site. Finally, in sections 5 and 6, the wider potential of the archaeological data and its significance are discussed. Proposals for

the analysis and publication of the archaeological data are given in a separate *Updated project design*, which combines this site with the adjacent excavations on Cromwell Green (sitecode CGW05).

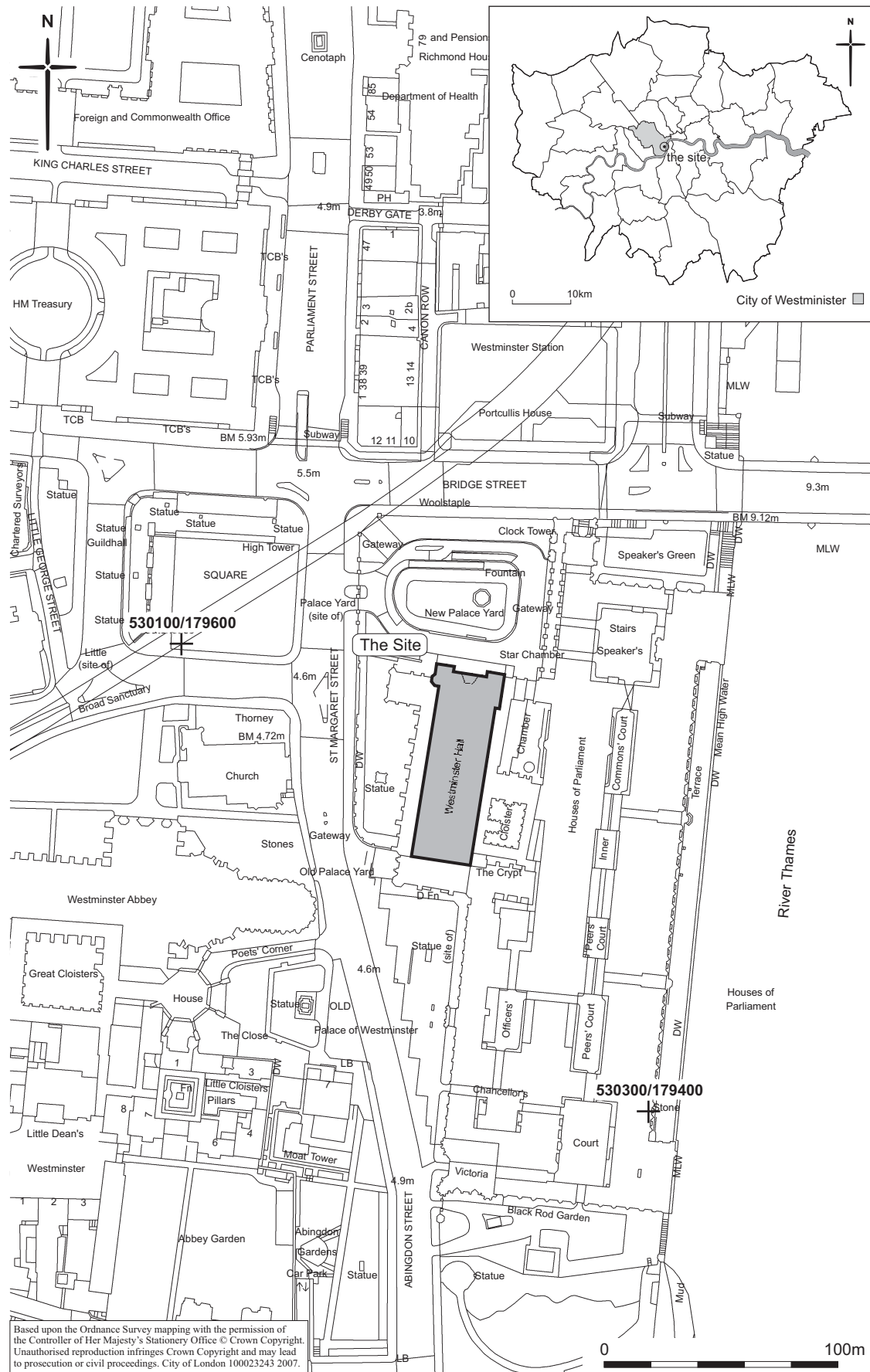


Fig 1 Site location

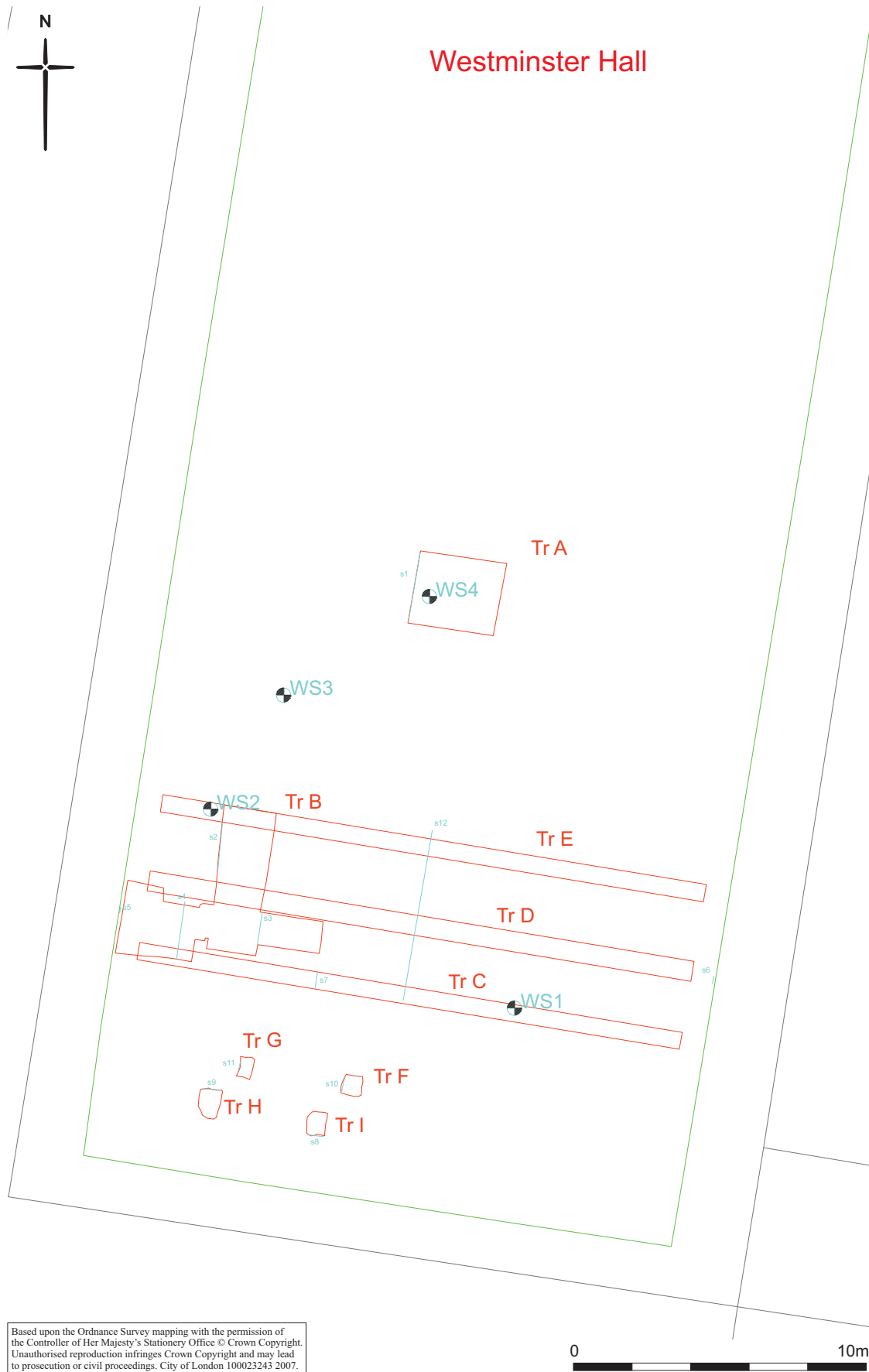


Fig 2 Map showing location of archaeological trenches, sections and window samples

2 Historical background and research aims

2.1 Historical background

The historical background to the project has been summarised in a number of documents, including Gifford's 2005 project document and MoLAS's Method statement of 2006. In summary, Westminster Hall was originally constructed in the 1090s as the great hall of William Rufus. It was substantially modified at the end of the 14th century when the walls were raised, a new floor laid, the hammerbeam roof constructed, and towers built at the north end. The south end of the hall was the site of the royal table at important ceremonial occasions and the site of the Courts of King's Bench and Chancery. The floor level was reduced in the 1830s to what was thought to be the 14th-century level and various other digging took place. In the mid 19th century the south window was removed and the wall opened out into an arch, set at the top of a new flight of 24 stone steps, leading to the recently added St Stephen's porch.

Prior to the medieval period there was certainly occupation on Thorney Island during the Neolithic period onwards but the site was probably too wet due to rising river levels from the late Bronze Age onwards. A channel beneath St Stephen's Chapel was revetted and, both to the north of that and under Cromwell Green to the west of Westminster Hall, there are numerous features comprising postholes, ditches and pits probably dating to the Neolithic period and Bronze Age.

2.2 Research aims

All research is undertaken within the priorities established in the Museum of London's A research framework for London Archaeology, 2002. The following archaeological research objectives were included in MoLAS' Method statement of 2005 and were compiled after consultation with appropriate specialists, and in particular with consideration of the results of previous archaeological investigations both on the site and on other sites in the area.

2.2.1 *Natural topography and the prehistoric environment*

- 1) *At what level does the surface of natural gravel lie?*
- 2) *Is there any evidence for prehistoric activity on the site either in the form of features or artefacts?*
- 3) *Is there evidence for the edge of stream channels or any alluviation on the site from the Neolithic or Bronze Age?*

2.2.2 *Medieval*

- 4) *What evidence is there for the original floors of Westminster Hall?*
- 5) *Can a central hearth be located?*
- 6) *What evidence is there for the continued use of the hall?*
- 7) *Is there any evidence for the king's bench or table?*

- 8) *Can the stonework used in the 14th-century construction be identified and can structures of furnishings be reconstructed from the evidence?*
- 9) *Were the internal faces of Westminster Hall behind the steps refaced in the 19th century or is there evidence of medieval stonework?*

2.2.3 Post-medieval

- 10) *What evidence is there for the construction of the steps in the mid 19th century?*
- 11) *What evidence is there for the construction of the floor in the mid 19th century?*

3 Interim statement on field work

In this chapter the archaeological results are discussed in five sections. The first section discusses the nationally important discovery of several pieces of the medieval King's Table. In section 3.2 the other results of 'below-ground' archaeology are discussed. In section 3.3 there is a description of the architectural recording of the south steps and, in section 3.4, the results of the geotechnical fieldwork are discussed. Finally, in section 3.5, we attempt a reconstruction of the historic floor levels of Westminster Hall, using the archaeological and geotechnical data to help understand the rather confusing levels data noted by Smirke in the 1830s.

3.1 The King's Table fragments

In 2005 Phil Emery and George Nash of Gifford monitored geotechnical work in the hall by Gifford's subcontractors. One part of this work was the recording of two small test pits which had been left open from previous work in 1960 in the cramped area underneath the south steps. A large fragment of medieval moulded stone was observed in one of the test pits. It was quickly realised by the Estates Archivist, Dr Mark Collins, that this was probably another fragment of the medieval King's Table, several fragments of which had been found in 1960 by Arnold Taylor of the Ministry of Works. Taylor had studied the fragments and drew a reconstruction of the table. The analysis was never published but his drawing may have been used when the fragments were conserved and displayed in the Jewel Tower, a part of the original Palace of Westminster in the care of English Heritage and open to the public. The 2005 rediscovery of the Table was clearly of national importance and the Table therefore became a priority consideration in the development, by Gifford in liaison with MoLAS, of the archaeological mitigation strategy to accompany the engineering works in the Hall. One of the excavation trenches was centred on the test pit in which the King's Table fragment had been observed. The objectives of this excavation included determining the origins and horizontal extent of the deposit containing the fragments and characterising the overall assemblage of moulded stonework present. The excavation revealed that the table fragments had been reused as part of a foundation for a 17th-century wall that fronted a dais at the south end of the hall. A 5.5m length of the 17th-century wall was uncovered and excavated in the trench and 14 more fragments of the King's Table (and a few other architectural fragments) were found in the wall foundation.

3.1.1 Methodology

The method of recording the table fragments broadly follows Council for British Archaeology guidelines for recording worked stone (Morris 1987). Refinements were introduced to ease the subsequent use of CAD. The techniques have little in common with conventional finds drawing and the aim was to produce a record that allowed all aspects of the stone to be understood without a need to re-inspect it. Such a 'substitute archive' (Samuel 2006a, 7) is analogous to preservation by record for excavation records. The stones were recorded in an unconserved state and so graffiti and masons'

marks may yet be revealed once re-used mortar is removed. The full methodology is given below (Section 4.3.1).

3.1.2 Summary of existing knowledge

No historical depiction of the table survives. Arnold Taylor studied the only nearly complete upright of this furniture discovered in 1960. It was broken into seven pieces, but the basic reconstruction was unambiguous. A single roughly square slab of Purbeck marble was skilfully pierced to form an entire arch with an integral sill, much as if it was a piece of wood. To put this on display after 1960 the upright was pieced together and the missing part replaced in wood. This exercise allowed a few vital statistics to be determined. Biddle was certainly correct in assuming that the ‘slab’ ran at 90 degrees to the long axis of the table, and because he lacked any other information he assumed that there were about four such uprights, supporting three slabs that formed the table top. He also noticed mortices and grooves for the iron fixtures fixing the top to the vertical uprights. The assembled block is 0.968m high and >0.93m wide (with the lost capital, the latter measurement was somewhat greater originally). One ‘edge’ of the upright was adorned with a colonnette absent from the opposite border, which was plain chamfered. Any kind of stylistic dating was hindered by the loss of the base and most of the capital. Biddle was able to produce an axonometric projection (shown in the Jewel Tower until 2005) showing four such arches supporting a table raised on a dais. There is no reason to doubt his assumption that the unadorned ‘edge’ faced the south wall of the hall while leaving enough space for those seated at the table.

3.1.3 The mid 13th-century Table

Six ‘new’ pieces of the original 13th-century table are represented but the simple ‘trestle’ reconstruction assumed by Biddle is unaffected. All the pieces are fragments of the uprights that supported the table top. No new fragments of the top itself were found but further evidence for the method of fixing it with iron dowels was seen, although only the mortices survive.

Some of the technological aspects of the construction of the table are now better understood: for example it is apparent that the masons split blocks by exploiting the close bedding of Purbeck marble and that this process could not be controlled with great precision. As a result each upright varied slightly in thickness, although this would not have been apparent to the eye. Three thicknesses (0.138m, 0.147m, 0.156m) were evident in the fragments which can therefore be identified as deriving from three separate uprights. Consequently, different fragments could be matched to their upright even where intervening fragments were lost. It is clear that the rather adventurous use of Purbeck marble caused problems. For example, the 0.138 metre-thick element shows no less than three careful repairs: both the upper corners had to be cut away and repair sections let in, probably at the time of assembly. The base cracked across the central ‘brace’ requiring the careful insertion of a staple.

The evidence for the three uprights is as follows:

- One of the freshly excavated fragments <10> can be identified as the missing part of the upright found in 1960 (the part replaced in wood in the post-1960

display of the table). Although some intervening fragments are still missing, the upright is now effectively complete with the exception of the capital.

- Fragments <27> <28> and <29> are part of another upright with a thickness of 0.138m. The size and geometry agree almost perfectly with the 1960 upright, including the slight pointing of the arch. The capital is mostly missing but the base survives well.
- The fragments from the third upright (0.156 m thick) include, for the first time, a capital <30>, missing only its abacus. Flame-like chamfer stops survive to either side. The three bases (<10><29><31>) demonstrate a uniformity of decorative treatment and permit an attempt at an art-historical dating (see Discussion 3.1.7 below). The outer colonnette and the reverse of the upright were flanked by hollow chamfers, which were usually terminated by stops resembling peas just beginning to sprout, but in one case these were omitted and the chamfers simply run into the bases (<31>). In the 1960 upright, these stops are not at a uniform level. Some waywardness of treatment seems to have been accepted.

Finishing was skimped, and only the frontal colonnettes and the uprights behind them were polished; the sides of the uprights were otherwise left in a rough state with the marks of the clawtool still clear. The toolkit used by the marbrers can be reconstructed in some detail from these and other marks.

3.1.4 *The first post-1300 table*

A second type of table is evidenced by four fragments of which by far the most well-preserved is <23>. The other fragments merely confirm that there were at least two uprights of this type. The chief fragment consists of half of a two-centred arch to which is appended a colonette and capital. Its general appearance was like the Purbeck marble table but it differed in almost all minor details, including the moulding. The two-centred arch is the same width as the Purbeck marble table and indicates a very similar technique of construction. The stone used was however a hard, dense and fine-grain limestone of a pale hue. Rather than attempt to cut an entire upright out of a single slab, the upright was assembled from at least two components meeting at the apex. The two components were united very solidly with a massive iron staple that ran the length of the flat upper surface. This was of course concealed by the table top. Unfortunately, whoever demolished the table almost entirely destroyed the capital in wresting the iron staple out, although enough survives to show that it differed from the capital employed in the Purbeck marble table. The base is lost.

On technical grounds it is possible to date this table to after c.1275. This is because the surfaces are highly polished with the comb. This tool only became widespread after the Black Death of 1347–8 (Samuel 2001, 154). The problems of dating are described below.

3.1.5 *The second post-1300 table*

This is perhaps the most problematic entity yet recognized. Four fragments of a fine yellow limestone (Caen stone?) were found. All were embellished with the same type of chamfer stop and all incorporated parts of arches, but there the similarities end. The

fragments belong to uprights of two different sizes and seem to come from two separate tables executed in a very similar style.

The slighter uprights were about 0.154m thick (six inches). The complete upright probably incorporated two small two-centred arches side by side. The fragment <26> is exactly a foot wide (0.304m). The probability is that the entire element was assembled from three pieces and was a yard wide. The three pieces were united at the apices by staples set in lead. These were set laterally into the ‘back’ of the upright rather than in its top. However, a fragment of the ?secondary arch <13> hints that the upright abutted a lost frontal upright.

The second table, apparently contemporary, is similar in style – the same type of chamfer stop is used, in building stone, in tooling and in technology but is more robust, with uprights 0.188m thick. This fragment can be identified as a lateral upright because it had a heavy colonnette applied to the ‘edge’ like the earlier tables. The capital was destroyed; again, due to removal of a staple during demolition. This lateral upright employed a single semi-elliptical arch; presumably assembled from two halves. The apex is lost and the overall width can only be conjectured. Again the use of such an arch has dating implications (see Discussion 3.1.7 below). Both this table and its apparent contemporary are dressed initially with a clawtool, the marks of which are mostly, but not entirely, removed with subsequent combing.

3.1.6 Other architectural fragments

A fragment of a large 11th-century cushion capital has been identified. This retains traces of paintwork and well-preserved toolmarks; intriguingly these include late medieval toolmarks. There is good reason therefore to see this as part of William Rufus’ hall, destroyed when the present Hall was created. An ashlar of this period has also been identified. Taynton stone was used at this time at St Paul’s Cathedral (Samuel 1999, 44) and the building stone superficially resembles that building stone or perhaps Marquise stone. Petrological analysis is of clear utility in this context. The careful tooling of the capital gives support to Stocker’s questioning (1993, 23) of the long-cherished assumption that early Norman masons worked only with a hafted adze. The early sourcing of alternatives to Caen stone by the Normans in England is also a related topic of interest.

A large number of pavement slabs fragments of all periods were kept, these were all long disturbed from their original locations and can only be broadly dated in a few instances. There is little that can be done with the majority of the fragments, given the absence of information. However, two instances of blocks deriving from a stepped ?dais of Purbeck marble were also recognised. These, and selected pavement slab fragments, are primarily of interest as subjects for petrological analysis (see below).

3.1.7 Discussion

It is now possible to place the Purbeck marble table more clearly in the Decorated tradition. It is logical to compare its details with Westminster Abbey where the details are quite closely dated. The surviving part of the capital can be compared to capitals within the Abbey in the eastern arm and transepts dated 1245-60 (RCHM 1924, 95). Similar base moulds can be seen in the nave bases of the first to fifth piers (1260-69) (ibid.), although these are in a very different order of scale.

The earliest reference to the table occurs during the reign of Edward I (1272-1307) (BA 2006, 7). The signs of haste in its design and execution may indicate that it was constructed quickly for Edward's coronation. Although only three uprights are known, this could be the table referred to in the coronation of Henry VIII and Katherine of Aragon, which is called a 'nine-piece table' by the chronicler Edward Hall. The remains of the other uprights probably remain in the undisturbed parts of the dais wall.

The analysis has thrown much light on how the table was assembled and the need to make running repairs. The masons seem to have worked from a timber model but took the risky step of setting the bed of the stone vertically, an unusual technique which caused problems. What works very well for timber may not suit stone, which behaves differently to wood under stress. Stone lacks any flexibility or 'give' and becomes brittle and prone to crack. Purbeck marble only behaves well 'on-edge' as a decorative panel, as in the Eleanor Cross from Cheapside (pers. obsvn) where it was used for heraldry c.1291-5 (Museum of London, accession nos 7240-1).

The earliest known reference notes two marble tables. Given what we have, the obvious assumption is that there were two tables constructed at the same time, using the same techniques. The Westminster table performed the same function as other feasting tables in Royal Palaces, such as one that once existed in the Grand Salle in the Conciergerie, Paris (Pers comm, Chris Thomas), but also had technical similarities to sanctified cenotaphs, such as the cenotaph of St Audemar (St Omer, Artois) which were hollow tombs into which the afflicted could climb (pers. obsvn).

The first of the two post-1300 tables is sufficiently similar to the Purbeck marble table to initially suggest a repair; but the presence of fragments from two uprights suggests that an entirely new table was built, designed to be compatible with the earlier table(s) but without their technical deficiencies.

The Caen stone table(s) would according to traditional thinking be assigned a 'Tudor' date. Although semi-elliptical arches occur as early as the mid-15th Century in such structures as the Leadenhall Seld (Samuel 1989, fig. 5), the chamfer stops are of late type, comparable to those in such Tudor works as, for example, the oriel (c.1472-98) of the Deanery Wells (Wood 1965, 79 & pl. 8). Could this be the nine-place table of Henry VIII and Katharine of Aragon's coronation? The successor made for Charles II was apparently *c* 7.3 x 1.8 metres (*c* 24 x 6 feet)¹. Was this reflecting the size of the lost table? The presence of cupboards for the King and Queen's plate is of interest in this context.

The end of the Hall was occupied by many fixtures and fittings prior to the Commonwealth, including a 13th-century table which predated the complete remodelling of the Hall in the 1390s. It remains to be seen if any new documentary evidence can be found for the coronation arrangements, which were no doubt subject to revision over several centuries (the 1390s, for example).

The Purbeck marble table can now be restored with confidence, but the complete form of the two later tables must remain largely conjectural. Nonetheless enough survives of both to permit at least a partial reconstruction.

¹ as scaled off the plan (held in the Palace Archive) published at the time of the Coronation Banquet

3.2 Archaeological fieldwork

The ‘below-ground’ archaeological data derives from two archaeological trenches situated towards the south of Westminster Hall, with some further data recorded during a watching brief on the piling programme. The following description is an interim statement and refers to ‘subgroups’ of archaeological contexts (eg ‘sgp2’ for subgroup 2).

The earliest deposit observed in the two trenches was a layer of alluvial clay-silt (sgp1), the top of which lay at 2.15m OD. The archaeological core samples (below, 3.4) show that this deposit is up to 1.2m thick. The alluvium was probably laid down in the mid 11th century during a time of severe flooding (Thomas et al 2006, 47 and 55).

Archaeological evidence for the Westminster Hall construction programme in the 1090s consists of layers of lime mortar and of crushed chalk and Reigate stone (sgps 2, 9 and 21). The upper surface of these deposits lie at 2.26m OD and there may well have been a stone floor laid on top.

Between the 12th and the 14th century the floor of the hall must have been repaired, patched up or relaid on a number of occasions: the archaeological evidence (not precisely datable) consists of alternating layers of soil, crushed stone and sand which were probably laid down to make good the unevenness resulting from settlement of the floor (sgps 3, 4, 10, 11, 14, 15 and 22).

Evidence for the major rebuilding campaign of the 1390s was seen in both archaeological trenches: over 25 post- and stake-holes were recorded (Fig 3; sgps 5 and 12), presumably traces of the mass of scaffolding which would have been required to raise the walls and build the new roof. The small quantities of pottery recovered from the fills of these features are dated to the 14th century and would therefore confirm that the features are traces of the late 14th-century building campaign. In the southern trench, a small area of stone flag floor survived *in situ* (at a level of 2.66m OD; sgp17) and its stratigraphic context and level suggest that this floor was associated with the late 14th-century hall. The largest slabs were 700 by 500mm (2’4” x 1’8”) and 50mm (2”) thick. The surviving floor slabs were left *in situ* (and therefore no samples were taken) but a number of apparently identical slab fragments were found *ex situ* in later layers. It will therefore be a research priority to analyse these and establish what stone was used (initial inspection suggests limestone rather than the historically-attested Purbeck marble). Further evidence for the layout of the late 14th-century hall was found in the northern trench: here, a layer interpreted as make up for the stone floor (which did not survive in this trench) was very hard and red-brown, suggesting it had been subject to heat (sgp6). The most likely heat source would have been a large open central hearth, situated approximately in this location under the lantern (no trace of any hearth structure was found). The final piece of evidence which may relate to the rebuilt medieval hall consists of a mass of chalk rubble seen in three locations under the modern south steps (sgps16 and 23): the rubble could well be make up for a raised medieval dais at the south end of the hall.

In the 17th or 18th century a brick wall was built across the south end of the hall (Fig 4; sgp18). The wall was 0.6m (2’) wide and it would presumably have supported a raised dais at the south end of the hall. It is hard to be certain of its date: the bricks look to be of approximately 17th-century date (although the full date range of the use

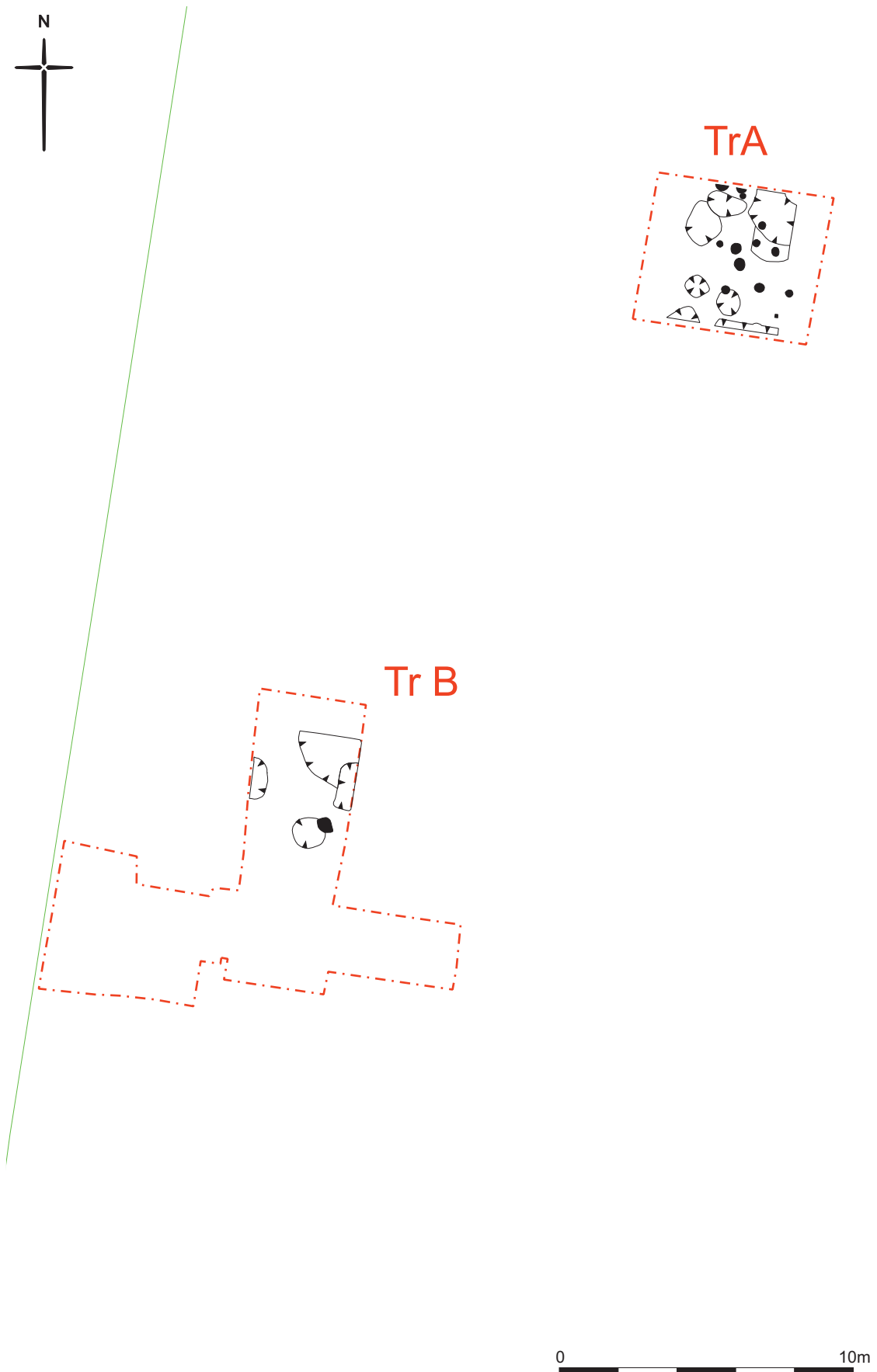


Fig 3 Plan showing the mass of post-holes and stake-holes which almost certainly relate to the rebuilding campaign of the 1390s

of this type of brick is 1450–1700) and it might therefore be the case that the dais was rebuilt as part of the works carried out for the coronation of Charles II in 1660 or James II in 1685 (Gerhold 1999, 31–2). Alternatively, the wall may be slightly later and be part of the base for William Kent’s new dais screen of 1739 (ibid, 46). It is clearly a research priority to see if there is any documentary evidence to pin down the date of construction of this dais wall (and, by implication, the date when the King’s Table was destroyed). The wall was built on a foundation course consisting of recycled stone, including several fragments of the medieval King’s Table (above, 3.1). It should be noted that this foundation is likely to survive *in situ* under the eastern half of the steps.

Other archaeological features are perhaps remains of minor works of the 17th and 18th centuries and these include various post-holes which might be evidence of roof repairs (sgps 7 and 13), and some irregular stone foundations for galleries along the west wall (sgps 19 and 20). The highest apparently pre-1830s floor level was recorded at 2.65m OD (sgp7) and it contained small quantities of pottery and clay tobacco pipes dating to after 1580, perhaps suggesting a deposition date in the 17th century (although this layer of made ground could simply be material redeposited during Smirke’s works of the 1830s).

The most recent archaeological ‘deposit’ in the hall is of course the floor (sgp8). The floor was laid in 1837 at the end of Robert Smirke’s restoration campaign (Gerhold 1999, 62–3). The huge York stone flags are just over 1.6m (5’) square and up to 100mm (4”) thick and rest on two courses of brick sleeper walls (generally a header wide where they support the join of two slabs and a stretcher wide where they support the middle of a slab). The brick walls, in turn, rest on a thick concrete slab (up to 1.0m or 3’ thick) which covers the entire floor. The slab has noticeable ‘tip lines’ (descending to the north) showing that it was poured in stages, proceeding from north to south. Smirke is celebrated today for his Greek Revival buildings such as the British Museum but he was also an engineering pioneer and early exponent of the use of concrete: he first used the technique at the Millbank Penitentiary in 1817–22 and again in the new Custom House of 1825–27 (Crook 1968). The Westminster Hall slab was one of his next uses of the newly developed material as a foundation raft and it is therefore of some significance in terms of understanding Smirke’s engineering career and in terms of the development of this crucially important building material. It may therefore be appropriate to carry out further documentary research into its use in the Hall.



Fig 4 View of the 17th- or 18th-century brick wall which probably supported a raised dais at the south end of the hall; note the stone fragment of the medieval King's Table

3.3 Architectural recording

The architectural recording work concentrated on recording the 1850s south steps of Westminster Hall as they were removed in order to carry out the remedial engineering programme. The underlying remains of the 1830s floor fabric were then recorded, along with traces of Frank Baines' early 20th-century (1914–23) repair works.

3.3.1 Robert Smirke's works of the 1830s

Robert Smirke carried out an extensive restoration campaign in the hall between 1834 and 1837 (Gerhold 1999, 62–3). This included refacing the inner faces of the walls and re-flooring the hall, at a lower level, in Crosland Hill sandstone (a York stone of Carboniferous origin). The architectural recording work by MoLAS concentrated on recording the traces of the 1830s floor where it had been subsequently covered by the new steps of the 1850s. The fabric of Smirke's 1830s floor has already been discussed (3.2 above): essentially the York stone flags rested on low brick 'sleeper' walls in order to allow air circulation, which would in turn avoid the stones being excessively cold or damp. The recent architectural observations show that where Barry's team built the new south steps in the 1850s, they first removed the valuable flags but left most of the sleeper walls in place, even reusing a few of these as the bases for the new steps support walls (Fig 5).

3.3.2 Charles Barry's works of the 1850s

Following a disastrous fire in October 1834 – which would have destroyed Westminster Hall were it not for the efforts of Robert Smirke's workers and a fortuitous change in wind direction – Charles Barry began planning a major reconstruction of the Palace (Gerhold 1999, 63–5). In the early 1850s he demolished the old south window of the hall, connecting the hall space to the new St Stephen's Porch (which lay to the south at a higher ground level) by a massive flight of steps that spanned the hall's full width.

The new steps were in Hopton Wood stone (a Carboniferous limestone from near Matlock, Derbyshire) and were supported by a series of north–south aligned brick spine walls, braced by a series of east–west arches: the steps were thus supported by both the spine walls and the arches. Fig 6 illustrates (in plan) the original 1850s spine walls and arches that were revealed when the steps were removed in 2006. Fig 7 is a cross-section of a typical brick spine wall, also showing the steps on top (the original site drawings were done in two parts: the stone steps were recorded and then carefully removed; the brick spine walls were subsequently recorded and demolished). Fig 8 is a view looking south-east at the steps during the dismantling and demolition process.

3.3.3 Frank Baines' works of 1914–23

Frank Baines supervised a major conservation campaign in Westminster Hall shortly after he took over responsibility for the building as head of the Ancient Monuments Branch of the Office of Works (Gerhold 1999, 67–9). After inspecting the roof he concluded that, due to an infestation of death-watch beetle, it was in imminent danger of collapse. He designed an ingenious steel framework – largely invisible from

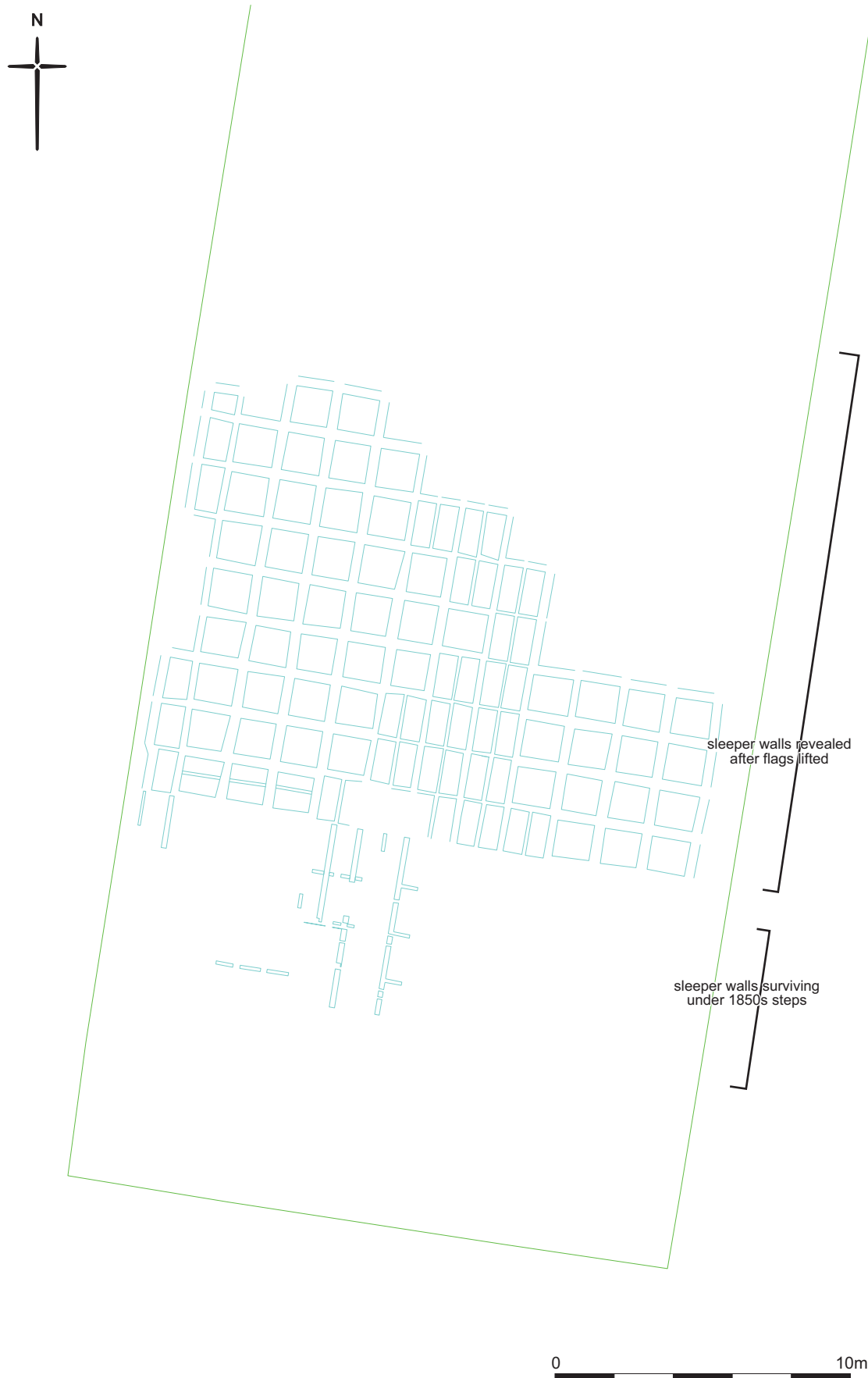


Fig 5 Plan showing the 'sleeper walls' for the 1830s flag floor revealed after lifting the flags and the walls partially preserved under the steps of the 1850s

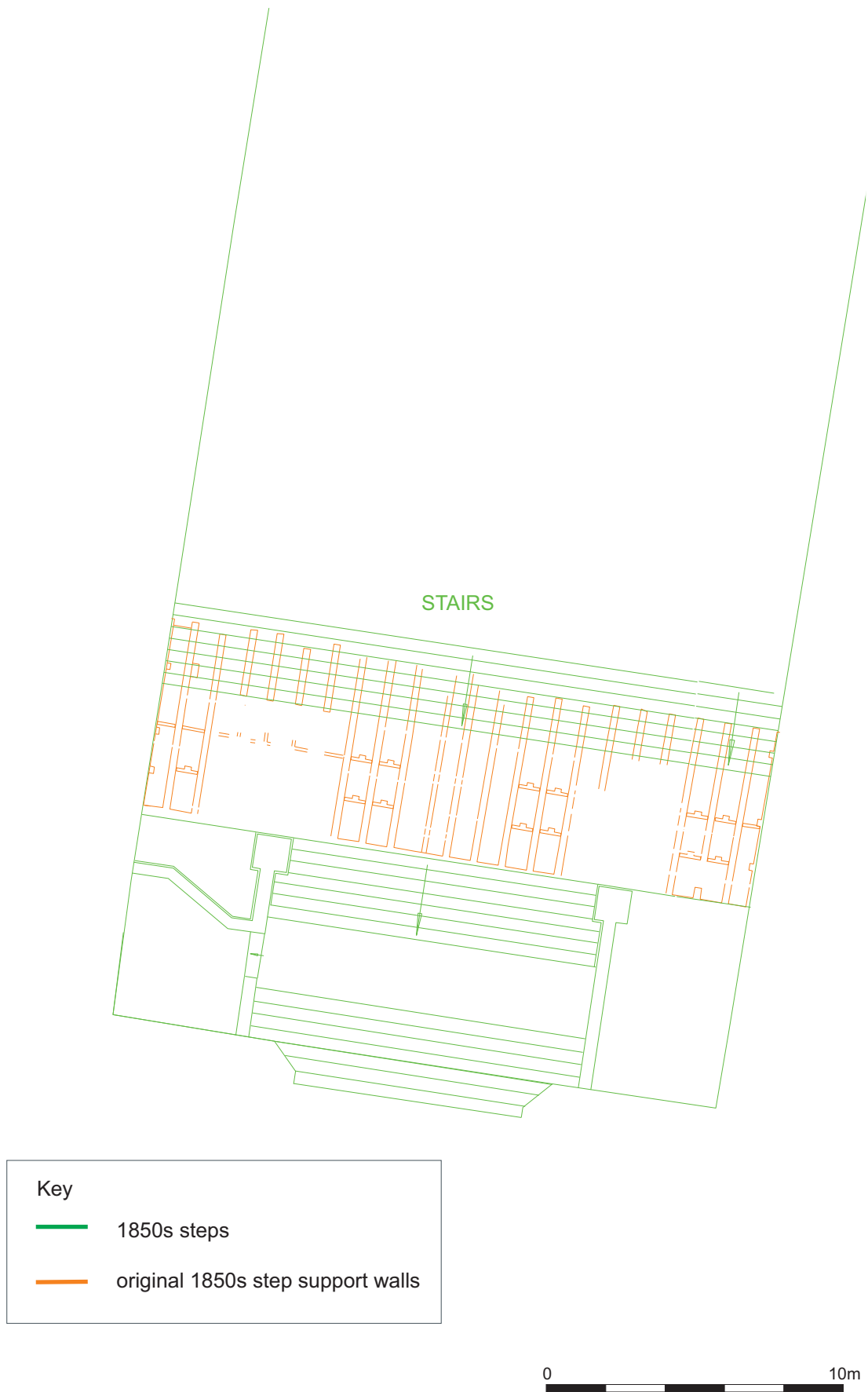
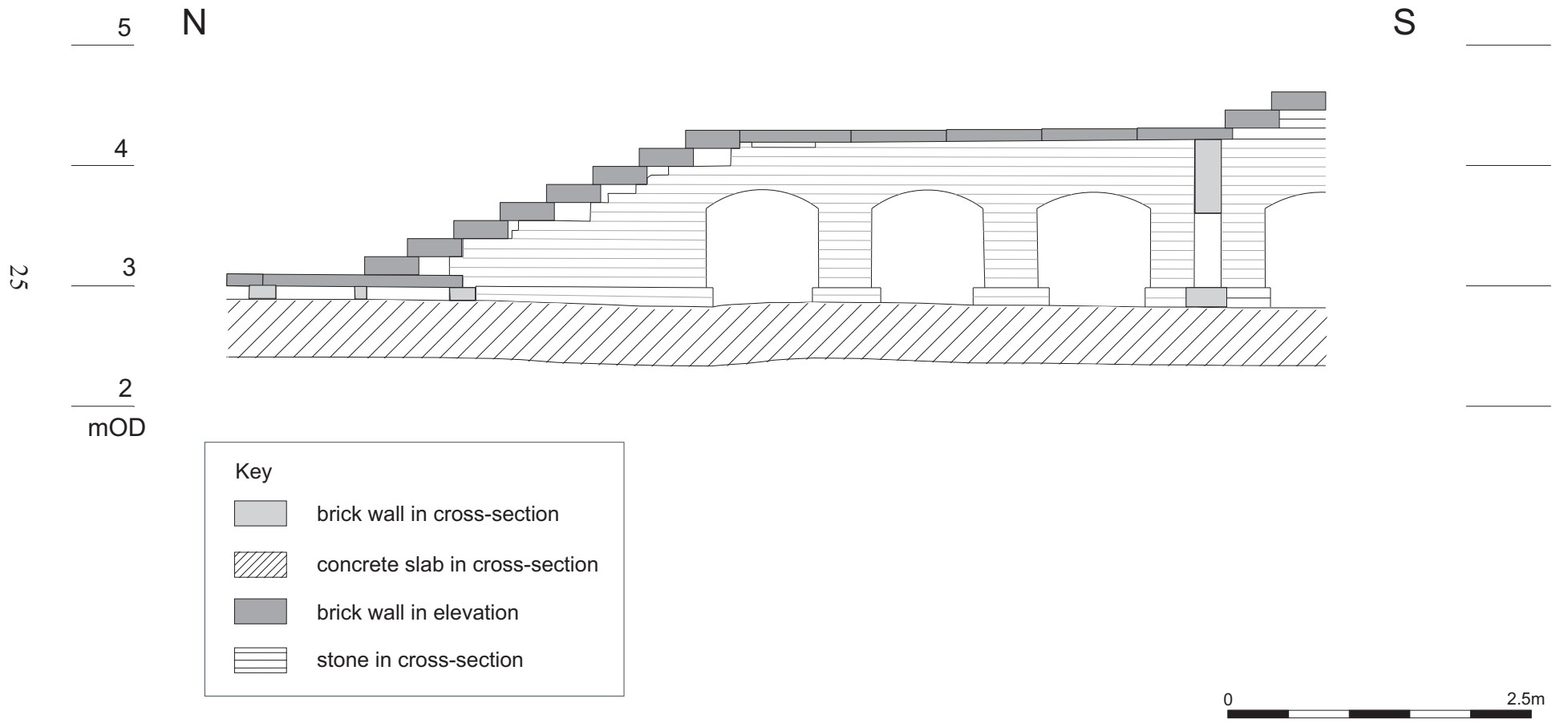


Fig 6 Plan of the 1850s 'spine' walls used to support the south steps



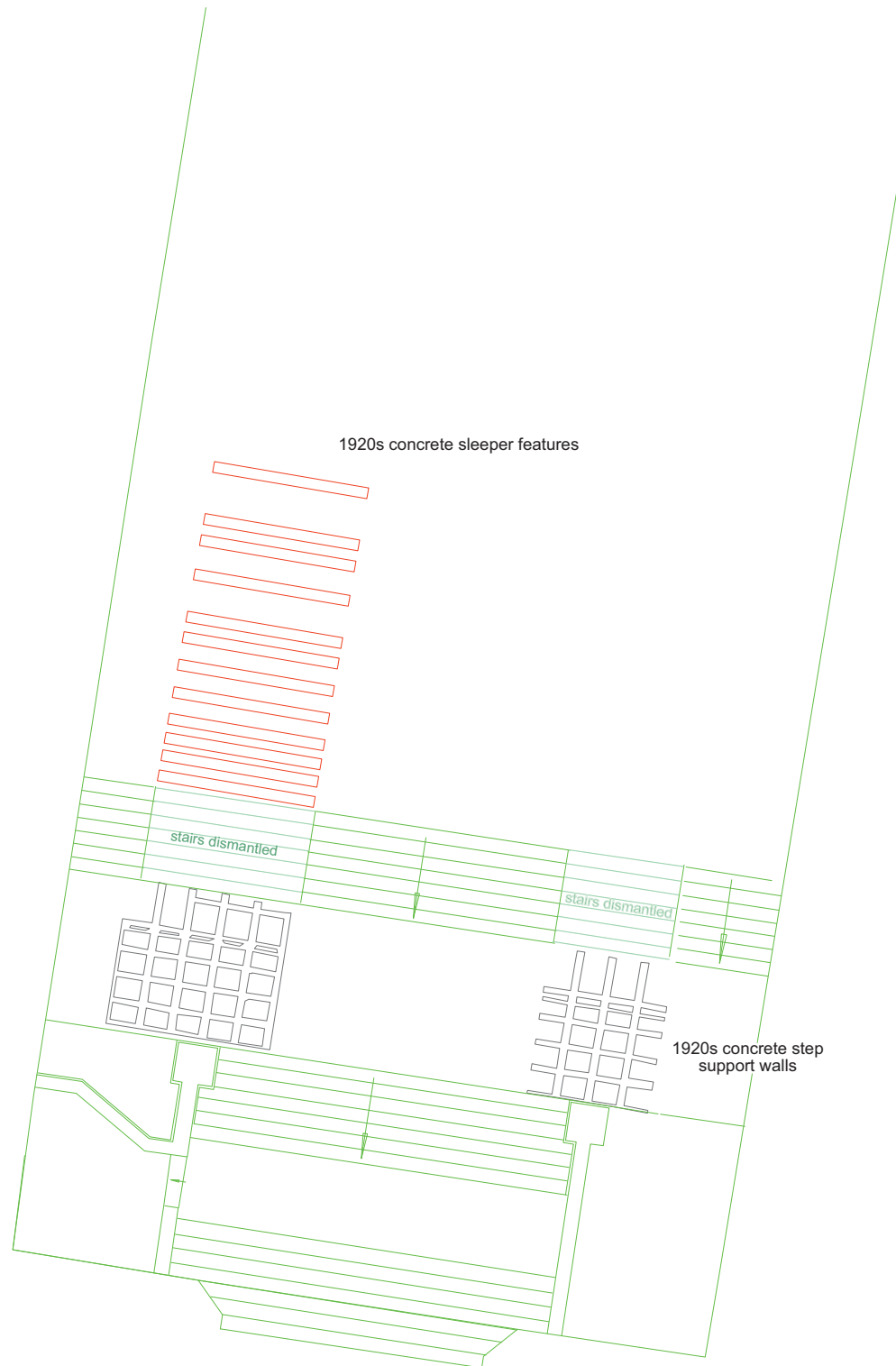
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Fig 7 Cross-section showing the profile of the south steps of the 1850s



Fig 8 View looking south-east at the 1850s south steps during their dismantling in 2006

ground level – to support the damaged timbers. The works began in 1914 and, after a delay caused by World War I, they were completed in 1923. Baines built a giant gantry system, running along the hall on two railway tracks, to gain access to the roof. The architectural recording of 2006 showed that he removed the flags, steps and support walls in two long ‘trenches’ in order to lay the temporary gantry tracks: traces of the concrete sleepers that supported the tracks survived in both east and west trenches (Fig 9). Following the completion of the roof, he re-laid the south steps after rebuilding the brick spine walls where necessary (the rebuilt walls are shown on Fig 9)



0 10m

Fig 9 Plan showing the parts of the south steps dismantled and rebuilt by Frank Baines in the early 20th century, and also showing traces of Baines' temporary works including his railway track sleepers

3.4 Geotechnical fieldwork

Graham Spurr (with a contribution by Stephen West, Gifford)

Four archaeological cores were taken in Westminster Hall in order to recover palaeoenvironmental data for this area, historically close to the east side of Thorney Island. Useful data was also obtained from the archaeological recording of some of the earlier geotechnical works by Gifford.

3.4.1 Background

The aim of a geoarchaeological investigation is to examine in situ soils and sediments either in plan and section, or by using borehole and augering techniques as necessary, and to take samples for off-site examination, as appropriate. The objectives are generally to understand the depositional and post-depositional processes that have operated on the site, reconstruct the changing environment and provide sufficient information to determine whether the sediments sampled are of great enough value to warrant further, more detailed archaeological or palaeoenvironmental investigation.

The BGS South London Sheet 270 shows that the site lies within the modern floodplain above Holocene alluvium. In this area the river Thames meanders close to the eastern edge of the floodplain, which extends for about 2km, with the river Tyburn feeding in across it from the northwest. Records from previous work in the area indicate that localised survival of raised areas of sand and gravel are likely to occur below later fine-grained alluvium on the floodplain. These ‘highs’ of sand and gravel mark the position of former islands or eyots, which would have remained as dry land as the surrounding area became waterlogged due to rising river levels during the Holocene.

The best known of these eyots, where the site is located, is Thorney Island, where an area of higher, drier ground is bounded by the Tyburn river just to the north and the Thames to the east. It is not thought that Thorney Island was present in the early part of the Holocene in the form it takes today but was simply a slightly raised gravel bar in a much more energised Thames floodplain river system at a level of approximately –6m OD. The island later became draped with sands and vegetated and although Mesolithic artefacts have been found in the sands, it is thought the island would not have held an attraction for more sustained habitation until the sedimentation had stabilised in the Neolithic (Sidell et al 2000).

Notably, the river Thames is today tidal upstream as far as Teddington Lock, although this has not been the case throughout the Holocene and the tidal head is thought to have reached the Westminster area during the Bronze Age, before migrating downstream again until the late Roman period (Sidell et al 2000).

3.4.2 Methodology

All geoarchaeological on-site drilling and off-site core preparation work was carried out in accordance with the written scheme of investigation. Four Terrier Rig (windowless sample) auger holes (WS1 to WS4) were sunk and monitored by a MoLAS archaeologist. Continuous cores (windowless samples) were obtained from all auger holes, extending from the present ground surface to the surface of river

terrace gravels. The windowless samples (1metre long plastic tubes of sediment) were sealed and transported back to the MoLAS laboratory for description and further sampling if deemed necessary. The auger locations and levels (m OD) were recorded by the MoLAS field archaeologist and subsequently plotted onto the OS Grid by a ‘best fit’.

The windowless samples were subsequently cut open and the sediments described using standard sedimentary criteria (relating to colour, compaction, texture, structure, bedding, inclusions, and clast size).

3.4.3 Description of the sediments (lithostratigraphy)

Sample WS1 was situated at the southern corner of the site. It was drilled to a depth of 5m, from a ground level of approximately 2.9m OD.

Table 1: The sedimentary sequence of WS1

Elevation	WS1 (Ground level at 2.9m OD)	Interpretation
2.9–1.9m OD	Modern brick fill	Westminster Hall Floor make up/fill
1.9–1.35m OD	2.5Y4/2 Dark grey brown stiff clay. Contact with below clear and horizontal.	11th -century alluvial deposit
1.35–1.15m OD	2.5Y4/2 Dark grey brown clayey fine sand with occasional granular to fine fragments of mortar, brick and chalk; moderately well sorted.	11th-century alluvial deposit
1.15–0.8m OD	2.5Y4/2 Dark grey brown stiff clay.	11th-century alluvial deposit
0.8– 0.65mOD	NOT RETRIEVED	
0.65–0.45m OD	2.5Y4/2 Dark grey brown clayey fine sand, very occasional charcoal flecks and single burnt flint. Contact with below diffuse.	Natural Sands
0.45– -2.1m OD	2.5Y 7/3 Pale yellow loose sand.	Natural Sands

Sample WS2 was situated at the western corner of the site. It was drilled to a depth of approximately 5m OD, from a ground level of 3.16m OD.

Table 2: The sedimentary sequence of WS2

Elevation	WS2 (Ground level at 3.16m OD)	Interpretation
3.16– 2.16m OD	NOT RETAINED	
2.16–1.86m OD	Very loose 2.5Y 5/2 greyish brown silty fine sand; frequent rounded to subangular flints and small, occasional mortar and brick fragments; contact with below clear and horizontal.	Westminster Hall Floor make up / fill
1.86–1.81m OD	2.5Y4/2 Dark grey brown stiff clay. Contact with below diffuse.	11th-century alluvial deposit
1.81–1.46m OD	2.5Y4/2 Dark grey brown fine sand. Contact with below diffuse.	11th-century alluvial deposit
1.46–1.36m OD	2.5Y4/2 Dark grey brown stiff clay. Contact with below diffuse.	11th-century alluvial deposit
1.36–1.26m OD	Limestone fragment	11th-century alluvial deposit
1.26–1.16m OD	2.5Y4/2 Dark grey brown stiff clay.	11th-century alluvial deposit
1.16– 0.66m OD	NOT RETAINED	
0.66– -1.74m	2.5Y 7/3 loose Pale yellow sand with iron staining near base at –1.76mOD.	Natural Sands

Sample WS3 was situated at the north-eastern corner of the southern end of the site. It was drilled to a depth of approximately 5.5m, from a ground level of 3.16m OD.

Table 3: The sedimentary sequence of WS3

Elevation	WS3 (Ground level at 3.16m OD)	Interpretation
3.16–2.66m OD	NOT RETAINED	
2.66–2.36m OD	Loose 2.5Y 7/2 pale grey fine sand; occasional subangular flints moderately poorly sorted; contact with below clear and horizontal.	Westminster Hall Floor make up/fill
2.36–2.21m OD	2.5Y4/2 Dark grey brown clayey fine sand with occasional to moderate subangular flint and mortar; very poorly sorted. Contact with below diffuse.	Westminster Hall Floor make up/fill
2.21–1.61m OD	10YR 5/6 Yellowish brown fine to medium sands with moderately frequent brick and chalk fragments with mortar. Contact with below clear and horizontal.	Westminster Hall Floor make up/fill
1.61–0.46m OD	2.5Y4/2 Dark grey brown stiff clay with single piece of limestone at 1.26m OD. Contact with below clear and horizontal.	11th-century alluvial deposit
0.46– -2.14mOD	2.5Y 7/3 Pale yellow loose sand iron staining at top and clayey toward base c. - 1.84mOD	Natural Sands

Sample WS4 was situated in the central southern area of the site. It was drilled to a depth of approximately 4m, from a ground level of 3.15m OD.

Table 4: The sedimentary sequence of WS4

Elevation	WS4 (Ground level at 3.15m OD)	Interpretation
3.15– 2.45m OD	Loose 2.5Y 7/2 pale grey gritty silty sand; frequent brick and cement fragments; very poorly sorted; contact with below clear and horizontal.	Westminster Hall Floor make up/fill
2.45–2.33m OD	2.5Y4/2 Dark grey brown silty clay. Contact with below graded.	11th-century alluvial deposit
2.33–2.15m OD	2.5Y light olive brown sandy clay with a single piece of bone at 2.2mOD. Contact with below graded.	11th-century alluvial deposit
2.15–0.95m OD	2.5Y4/2 Dark grey brown stiff silty clay. Contact with below clear and horizontal.	11th-century alluvial deposit
0.95– -0.75m OD	2.5Y 7/3 Pale yellow loose sand, iron staining at top and clayey at base. Contact with below clear and horizontal.	Natural Sands
-0.75– -0.83mOD	2.5Y 7/3 Pale yellow clayey sand (becoming less clayey by -0.83mOD) and moderately frequent subrounded to subangular gravel.	Natural Sands

3.4.4 Discussion

Sands were recorded at the base of the sedimentary sequence in all profiles and their surface undulates across the site. Found to be typically loose, fine to medium, iron rich sands, they represent deposits laid down naturally in a fluvial environment throughout the Holocene. The sands probably accumulated over an area of high gravel which was a remnant of the braided river system of the pre-Holocene Thames – gravels which possibly were touched at the base of WS4. The gravel would have been progressively draped with sands throughout the Holocene, creating the irregular surface we see today. The irregular surface of the sands probably results from the pattern of deposition and erosion, by both the Tyburn and the Thames, which took place episodically across the site and can be taken to indicate the natural surface prior to human intervention. To this end, the surface of the sands, which have been found to underlie the Westminster area as a whole, has been used to construct a subsurface contour plot (Fig 10). The plot combines data from the MoLAS geoarchaeological work, the Gifford work and existing MoLAS data (Sidell et al 2000).

The plot of the Westminster area visibly shows the area of the site to be an island with a deep channel area running from the southwest around the north of the site with a lesser channel to the south and both entering the broad, deeper channel area to the

east. This is the outline of Thorney Island surrounded by the Tyburn River, known through historical documentation to have existed in the area, entering into the deeper wider Thames channel. The contour plot of the site itself clearly shows Westminster Hall to occupy an area that dips away by approximately 2m both to the north and south from a central area high of around 1 to 1.5m AOD. In the southern area however, with its cluster of boreholes and augerholes that gives the most detailed picture. The southern area clearly indicates an elongated deeper part of the site on a northwest to the southeast axis with two high points on either side of it. Given the site's proximity to the Thames on the eastern side, this deeper area could be indicative of an inlet. Recent archaeological work in Cromwell Green suggests that this inlet could in fact be a small natural channel of Roman or early medieval date, flowing east into the Thames.

A profile of the postulated channel is illustrated in Fig 11. The cross-section runs north-south along the length of the hall and uses geoarchaeological and archaeological data, as well as geotechnical data supplied by Gifford. It can be seen that the upper levels of both the 11th-century alluvium and the Holocene sands are generally fairly level, although slightly higher at the south end of the hall. However, the postulated channel can be seen cutting into the Holocene sands (and filled with alluvium) towards the south of the hall. Interestingly, it only appears to be one metre deep, although it may well be the case that we do not have data for the deepest part of the channel.

It seems highly likely that this infilled channel is the cause of the excessive displacement of the floor flags and steps in Westminster Hall (MoLAS gratefully acknowledges the contribution of Stephen West of Gifford to this discussion). Typically, one would expect the settlement of the Holocene sands in response to applied load to be of less magnitude than the channel fill of soft clays and organic soils (and, by the first millennium AD, the sands would probably have been fairly stable and no longer subject to self settlement). Furthermore, the sands local to the channel are of a loose, *i.e.* low, density and have a relatively high volume of cohesive particles compared to the main body of the Holocene Sand: these conditions have led to differential settlement and subsequent long-term 'creep' in the soft clays and organic soils filling in the postulated channel. The settlement of the overlying floor layers (in the areas where the floor directly overlay the channel) was probably already a problem in the medieval period: the archaeological evidence reveals greater amounts of medieval make-up in the archaeological pit that directly overlay the channel. The settlement may then have been exacerbated by the increased load caused by the 1830s concrete slab and by the south steps of the 1850s.

The dark grey-brown stiff clays that overlay the sands across the site are considered to be deposits laid down in floods occurring across the Westminster area in the 11th Century (*c* 1050 AD) (Sidell et al 2000). It is likely that these clays were deposited during a period of rising river levels; a new river wall was built in 1179-80 (Colvin et al 1963, 493).

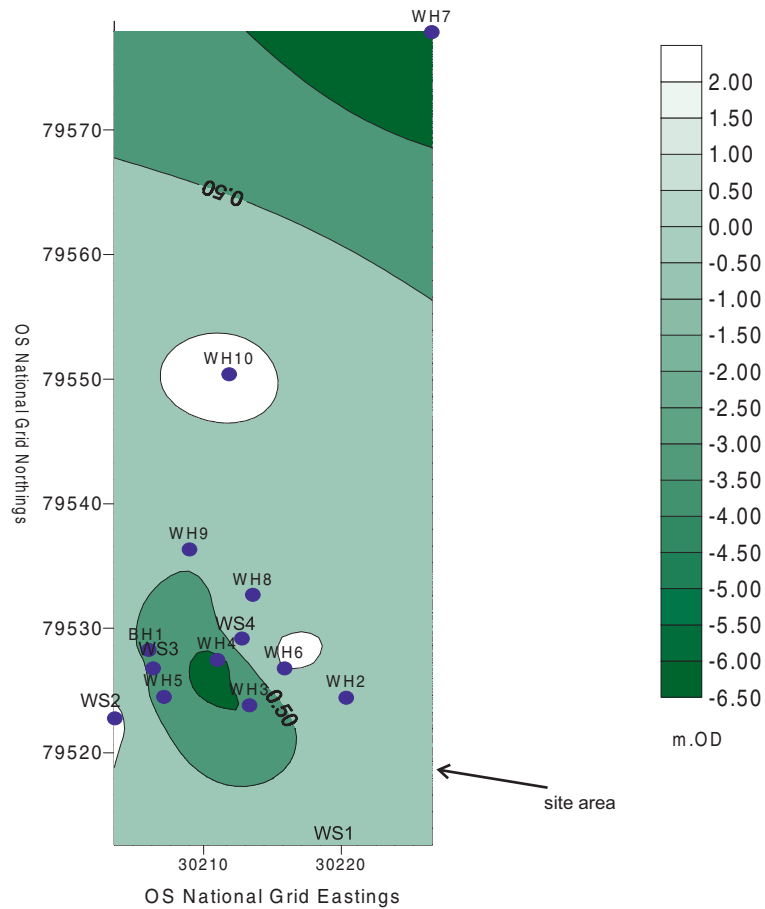
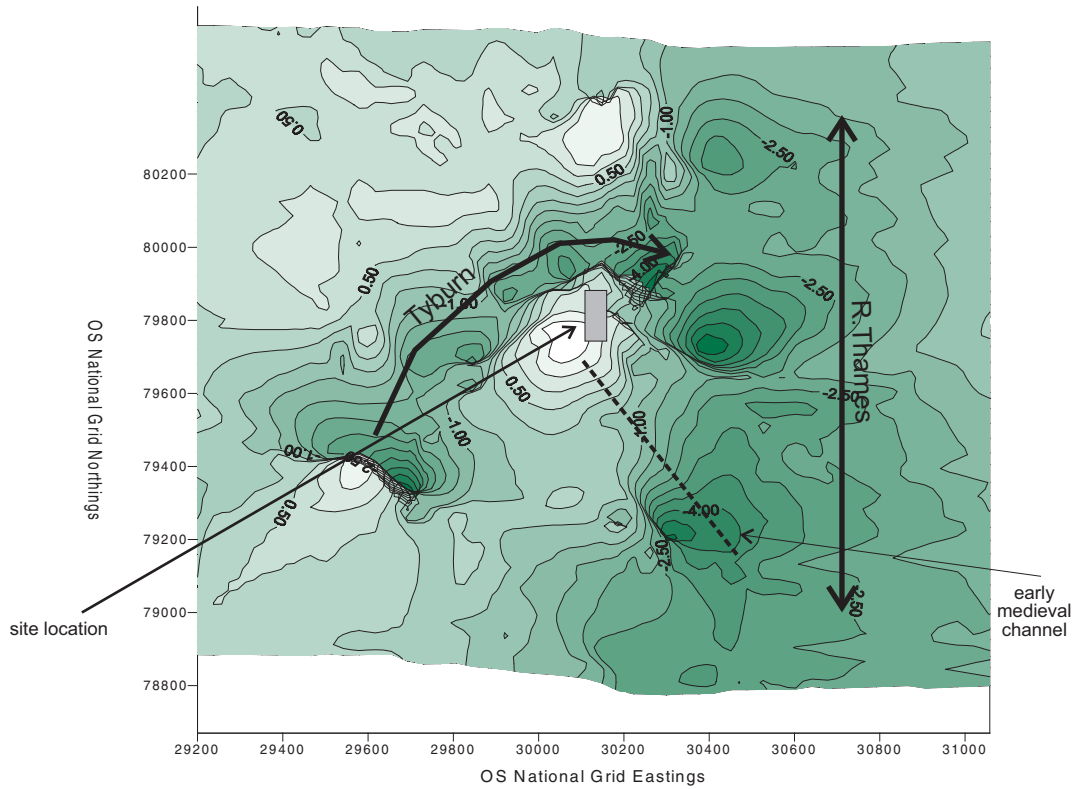


Fig 10 Subsurface contour plot of the Holocene sands under Westminster Hall, showing evidence of a channel of possible medieval date (WS1-4 are MoLAS 2006 window samples and BH1-10 are Gifford 2005 boreholes)

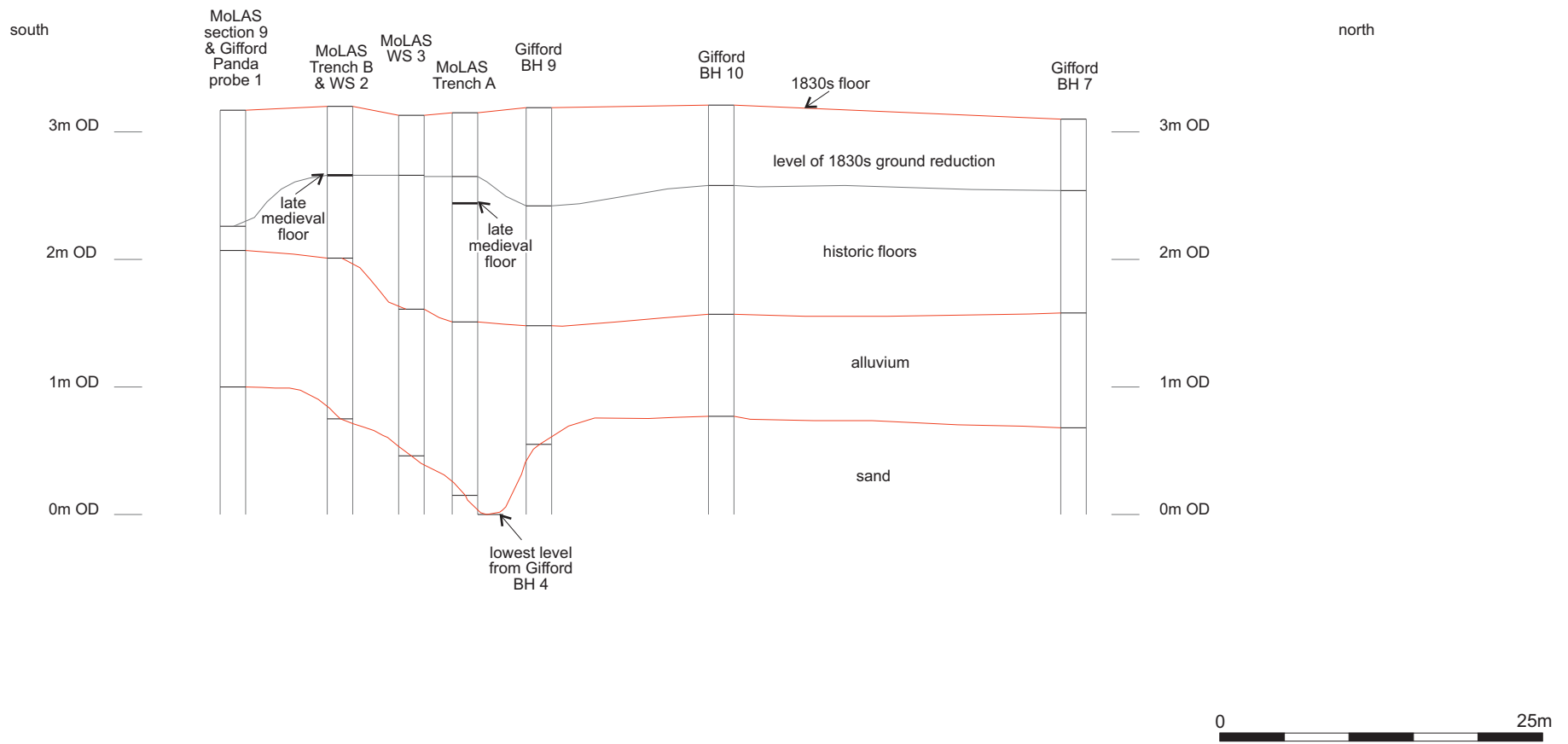


Fig 11 Reconstructed north-south cross-section under Westminster Hall, using MoLAS archaeological and geoaerchaeological data, and Gifford geotechnical data (vertical scale 1:50, horizontal scale 1:500)

3.5 Reconstruction of the historic floor levels of Westminster Hall

Although it was not a formally defined research aim (above, 2.2) in this section we review the evidence for the historic floor levels of Westminster Hall, attempting, in particular, to link the data from the recent excavations with the archaeological data recorded by Smirke in the 1830s. Smirke reduced the level of the hall floor by about two feet but it is important to note that he removed the deposits under the hall to an even lower level in order to accommodate a concrete slab and brick sleeper walls beneath the new floor. Smirke described the various layers he encountered on the site and noted the approximate thicknesses and/or depths of these layers (1836, 416) and his is the only record of the hall's post-medieval floors and their levels.

In Fig 12 we attempt to compare, in outline, the deposits recorded by Smirke with those recorded in the 2006 excavations. The main problem is that Smirke does not relate his recorded levels to any objective datum (the first British Ordnance Datum at Liverpool was not established until 1841). We therefore have to find common layers in the 2006 and the 1830s recording in order to line up the two sets of data. This has been attempted in Fig 12 by lining up approximately the recorded upper levels of natural sands, early medieval alluvium and the depth of 1830s ground reduction. In general, the degree of correspondence between the two sets of data is remarkably good. One interesting point is that the Purbeck marble floor assumed by Smirke to be the original *c* 1390 floor now looks to be significantly later, given its relatively high level. Of course, the Purbeck slabs themselves may well have been first laid in the late 14th-century hall but it now seems likely that they had been removed and relaid at a higher level, perhaps in response to a flood in the 16th or 17th century. In Table 5 we tabulate the combined dataset in order to reconstruct a full sequence of floor levels ranging from, at the base, the pre-hall ground level in the 1090s up to the highest recorded floor level in the 18th century. The pre-hall ground level of the 1090s was almost certainly somewhat irregular and it sloped down to the east, which would explain the variations recorded in the depth of made ground under the earliest floor (the thickness of this 1090s construction make-up varies between about 0.3m and 0.9m). The new reconstruction given in Table 5 broadly agrees with the interpretation of Thomas et al (2006, 49) and it also resolves some of the more anomalous levels recorded by Smirke and discussed by Thomas (*ibid*).

Table 5 Reconstructed full sequence of historic floor levels of Westminster Hall, combining modern archaeological data with Smirke's 1830s data

18th-century flagstone floor	3.8m OD
16th- or 17th-century Purbeck marble floor level	3.4m OD
1830s York stone floor (= modern level)	3.2m OD
Floor of 1390s hall	2.7m OD
Floor of 1090s hall	2.3m OD
Ground level <i>c</i> 1090	2.0m OD

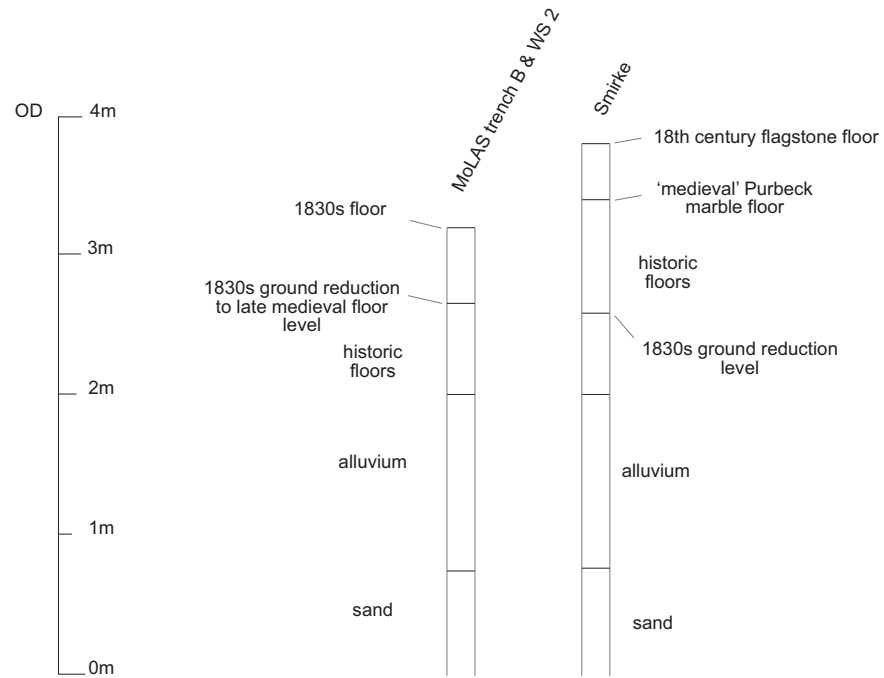


Fig 12 Comparison of archaeologically observed levels under Westminster Hall with those recorded by Smirke in the 1830s (vertical scale 1:50)

4 Quantification and assessment

4.1 Post-excavation review

The site's stratigraphic context records have been entered onto MoLAS' Oracle database. There is a site matrix on film (the site sequence is probably not complicated enough to warrant entering the matrix onto software). The 109 contexts recorded on site have been sub-grouped into 23 subgroups (and a subgroup matrix has been compiled and the subgroups have been entered into the Oracle database). The archaeological trenches, watching brief areas and the area of architectural recording have been located on the modern Ordnance Survey grid, using a detailed survey of Westminster Hall supplied by Gifford. All relevant plans have been digitised. Sketched and measured architectural recording data has also been digitised where appropriate. All finds have been spot-dated and assessed; the environmental core samples have been described and assessed. The 35mm slides have been annotated with film, year and image numbers. Contact cards of medium format shots have been annotated.

In the subsequent analysis stage, the stratigraphic author will need to group the subgroups and then define land uses and periods.

4.2 The site archive and assessment: stratigraphic

Table 6 Quantification of stratigraphic and architectural records

Type	Description	Quantity	Notes
Contexts		109	
Plans	'A4' 1:20 on permatrace	20	includes 2 trench plans
Sections	'A4' 1:20 and 1:10 on permatrace	11	
Matrices	A4' permatrace	4	includes 2 site matrices and 2 post-excavation matrices
Large plans	A2 and A3 paper plots with annotations	7	includes unannotated photocopy of 1950 plan drawing 210/89 of the spine walls supporting the south steps
Photographs	Digital .jpg	9	= 9 images
	Colour slides	123	= 40 images

4.3 Site archive and assessment: finds and environmental

Table 7 Quantification of finds and environmental material from site WME06

Architectural fragments	14 fragments to be retained; additional 11 fragments to be used for petrological analysis
Building material	1 crate of ceramic building material (bulk of material discarded after assessment). Total 12.4kg 1 retained shoe box of ceramic building material
Late Saxon and medieval pottery	80 sherds. Total 0.67 kg
Post-medieval pottery	12 sherds. Total 0.22 kg
Accessioned finds	6 objects (including 3 copper alloy, 1 lead, 1 bone and 1 other material)
Clay pipes	18 fragments (including 1 accession)
Flint	1 worked prehistoric fragment
Environmental core samples	4 core samples, each with a total length of 4–5m
Animal bone	0.760 kg, approximately 111 fragments, from 13 contexts/1 archive quality ‘shoebox’

4.3.1 *The architectural fragments*

Mark Samuel

4.3.1.1 *Methodology*

The creation of a ‘substitute archive’ – a record that allows all aspects of the stone to be understood without a need for re-inspection – involved the following tasks:

- Moulding records drawn at 1:1 on plain drafting film using a profile gauge or by direct tracing of the stone laid on the film (or a combination of the two). The complete profiles were inked in. Arc segments were recorded by profile gauge and their positions noted. The ‘zones’ of tooling marks around the circumference were demarcated. Sample rubbings of toolmarks were made on separate A4 sheets of acid-free paper using brass-rubbing crayons.
- Drawings were all fully captioned. There was only one moulding profile per sheet of film to ease comparison.
- All elevation drawings were directly traced. These ‘elevations’ were inked-in for permanence.
- Drawings have been done at A4, A2 or A1 size. A4 size are stored in ring binder files but the remainder are stored loose.
- Worked stone recording sheets have been filled in as appropriate and additional dimensional sketches and details are drawn on the reverse where appropriate.
- Digital photographs were taken by the object handler prior to recording by the author. Selected details will be photographed by MoLAS for purposes of publication.

- All records are fully labelled with site code, context numbers, accession numbers, initials, recorded scale and scale bars and other details as appropriate.

Items have been marked as recorded; where appropriate, items are flagged for photography, petrographic analysis etc.

4.3.1.2 *Typestones and builds*

Table 8 Typestones and builds

Build	Group	Typestones (accession nos)	Description
A	1	14, 23, 35,38	First post-1300 table
B	1	1960 upright, 10	Mid 13th-C table (147mm)
B	2	27, 28, 29	Mid 13th-C table (138mm)
B	3	30, 31	Mid 13th C table (158mm)
C	1	24, 25	2nd post-1300 table(s)
C	2	13, 26	2nd post-1300 table(s)

4.3.1.3 *Petrological analysis*

Table 9 Architectural fragments suitable for petrological analysis.

Context	Accession	Petrology	Description
86	12	Purbeck marble	Part of raised dais (?)
72	16	Purbeck marble	Pavior with wear on one edge, step?
72	47	Purbeck marble?	Pavior
72	50	Portland stone	Paving slab fragment
86	59	Purbeck marble	Fragment of table? (suitable for preparation of thin section)
72	67	?	Pavior fragment
72	68	York stone (?)	Paving slab fragment
72	69	?	Pavior fragment
86	74	Oolitic limestone.	Ashlar (Norman)
72	79	Marble	Exotic veneer (medieval?)
72	80	York stone (?)	Paving stone fragment

These 11 samples shall be dealt with by a qualified geologist. Thin sections will be prepared to be examined and recorded with a petrological photomicroscope; photomicrographs will be taken. General features will then be described and detailed observations made of the thin sections. These thin sections and descriptions should be published for comparative purposes to help relieve the general shortfall in this type of archaeological publication.

There are several sophisticated new methods available that could be used to accurately determine source, which involve greater expense, but may be justifiable in the context of such an important monument.

4.3.1.4 *Conservation issues*

The majority of the fragments are largely obscured by 17th-century mortar as well as being badly fragmented. The mortar can be removed without any particularly sophisticated techniques. No paint was observed on the table fragments but whitewash survives on the 11th-century capital fragment. The stones did however

display damage and wear and patination that had occurred during use. One fragment <29> of Purbeck marble is laminating badly and needs stabilization, but for the most part the stones are stable. The labels need to be reattached with a non-biodegradable string and the stones directly marked.

4.3.2 The building material

Ian Betts

4.3.2.1 Methodology

All the building material has been recorded using the standard recording forms used by the Museum of London. This has involved fabric analysis undertaken with a x10 binocular microscope. The information on the recording forms has been added to an Oracle database.

Table 10 Building material

Material	Count	Count as % of total	Weight (kg)	Weight as % of total
Stone*	1	1	0.30	2.4
Roman ceramic	3	2	0.59	4.8
Medieval ceramic**	130	89	6.29	50.9
Post-med ceramic	10	7	4.95	40.0
Mortar	2	1	0.23	1.9
Total	146		12.37	

* stone rubble (not including King's Table fragments)

** includes some types which continue into the post-medieval period

4.3.2.2 Roman ceramic building material

Part of a reused Roman brick was found with medieval peg roofing tile in a medieval make up layer (context [15]; fabric 2459B). What may be a very damaged Roman roofing tile was present in a post-medieval post-hole (context [88]; probably Roman fabric- group 2815).

4.3.2.3 Medieval stone building material

A sample of the rubble make up material for one of the 13th- or 14th-century floors of Westminster Hall (context [67]) can be identified as Kentish ragstone from the Maidstone area of Kent; it was found with medieval roofing tile and a shaped mortar block.

4.3.2.4 Medieval ceramic building material

Two fragments of partly worn plain glazed 'Westminster' tile (dating to 1250–1300) were recovered from post-medieval post-holes (contexts [7] and [13]). One has a dark brown glaze, whilst the other, which is triangular in shape, has a mottled light and dark brown glaze colour. These probably derived from Westminster Abbey or the Palace of Westminster. Tiles in this group were first recognised at the abbey and were given the name 'Westminster', although this is a little unfortunate as they were actually made at Farringdon in London (Betts 2002, 10–11).

One fragment of plain glazed Flemish tile (dating to *c* 1300–1480) was found in a large medieval roofing tile assemblage in a post-medieval floor make-up layer (context [4]). This may also have come from the Abbey or the Palace of Westminster. The tile shows slight wear on its upper surface. It measures 25mm in thickness indicating a probable 14th or 15th century date

A large quantity of medieval peg roofing tile was recovered. Most of these tiles are probably roughly contemporary with the associated pottery which mostly dates to the period 1240/70 to 1350/1400. As is normal on London sites the vast majority of peg tiles were made at tileries which are believed to have been located close to London. They are of standard two round nail hole type and many examples have a splash glaze present. One tile (fabric 2271, [4]) has a diagonal line (Λ) cut into the tile side with a knife or sharp object. This could be some kind of tally/batch mark, or it may be an accidental mark of no special significance.

More interesting are three peg roofing tiles which have been brought in from outside the London area. Two ([13], [15]) have a slight silty fabric (type 3062) whilst the other ([4]) has a number of very small white calcium carbonate inclusions (fabric 3097). The latter has been found at a number of sites in north Kent, which is undoubtedly the source of the WME06 example, whilst the silty tiles have similarities in fabric to a number of Penn floor tiles from Buckinghamshire which may be the source, although this is far from certain.

The top of the roof of peg tiled buildings would have been covered with a line of curved ridge tiles. A small number of fragments were recovered from the site.

A wedge shaped block of white mortar was found with Kentish ragstone rubble and medieval splash glazed peg roofing tile in context [67]. The function of the shaped mortar block is uncertain.

4.3.2.5 Post-medieval ceramic building material

Some post-medieval peg roofing tile was recovered from post-medieval floor make-up contexts ([72] and [88]). The former is associated with post-medieval pottery and clay pipe of 1770/1840 to 1900/1910 date.

Seven fragments of red brick in fabric type 3046 (dated to the period 1450–1666) were clearly reused in a wall of 17th- or 18th-century date that fronted the raised dais of Westminster Hall ([86]). All the bricks are incomplete but the most complete examples measure 111mm in breadth by 60–61mm in thickness.

4.3.2.6 Uncertain fired ceramic

A very small (1gm) fragment of fired ceramic was found in the 11th-century flood deposit (context [95]). The function of this object, which has a smoothed top and part of a bevelled smoothed side, is uncertain due to the small fragment size. It need not be building material.

4.3.3 The pottery

Nigel Jeffries

The pottery assemblage from the archaeological excavation in Westminster Hall has been identified using Museum of London medieval and later type-series. The pottery

was examined macroscopically, using a binocular microscope (x20) when appropriate, and recorded on paper and computer, using standard Museum of London pottery codes for fabrics, forms and decoration. The numerical data comprises sherd count, estimated number of vessels and weight. This assessment aims to evaluate the character and the date range of the assemblage, determine the research questions the pottery has the potential to address and identify any areas of further work.

4.3.3.1 Medieval pottery

The medieval pottery consists of 80 sherds from a minimum number of 55 vessels (Estimated number of vessels: ENV), and weighed a total of 673g (giving a mean weight per vessel of 12g). The assemblage consists of small groups (22 contexts yielded fewer than 29 sherds) and is a fragmented state, comprising small-sized sherds with little in the way of identifiable diagnostic features that could refine the fabrics and forms recorded. Despite their poor condition, the fabrics and forms could be identified with a degree of confidence as much of this assemblage comprises the well understood and published products of either the Surrey whiteware or the London-type ware industries (Pearce and Vince 1988; Pearce, Vince and Jenner 1985). A consistent chronology for the land use at Westminster Hall could therefore be established, as the absence of residual pottery from the early medieval period provides a solid date-range of 1240/70 to 1350/1400 for most of the Westminster Hall floor deposits. The most likely interpretation is that the floor deposits generally pre-date the large rebuilding campaign of the 1390s (while allowing that much of this pottery was recovered from post-holes which cut through these earlier deposits).

Surrey whitewares constitute nearly three quarters of the pottery from Westminster Hall (by vessel count), dividing more or less equally between the two dominant fabrics produced by this industry, Kingston-type ware (KING) and coarse border ware (CBW). Although many of these sherds are unglazed, they appear derived from jugs rather than jars, which in turn perhaps reflects pottery use on this site and its immediate environs. The next most frequent pottery type is London type-ware, which despite being recovered in similar fragmented condition tends to be better preserved than its Surrey whiteware counterparts.

4.3.3.2 The post-medieval pottery

The post-medieval pottery found from WME06 comprises 12 sherds from 11 vessels (ENV) and has a total weight of 224g (giving a mean weight per vessel of 20.3g). The assemblage was found as five small-sized groups (contexts yielding less than 30 sherds, from [5], [72], [73], [82] and [86]), each of which had roughly equal quantities of medieval pottery. The contexts are probably to be interpreted as evidence of post-medieval repairs and floor maintenance within the hall. The post-medieval fabrics mostly date between the late 15th to 17th century.

Six sherds are London-area early post-medieval redware (PMRE), used to describe an unglazed or partially clear lead or copper-flecked green glazed ware with a reddish-brown fabric, but often with a reduced, grey surface. Dating between 1480 and 1550, context [86] provides the only chronologically coherent group, containing PMRE bowls or dishes, together with a sherd of similar dated and sourced post-medieval bichrome redware (PMBR) and early Surrey-Hampshire border whiteware (EBORD). This context is in fact a 17th- or 18th-century wall that supported a dais at the south

end of the hall. The latest pottery is provided by the black-basalt ware (BBAS) moulded teapot dating between 1770 and 1850, recovered from just under Smirke's concrete slab of the 1830s (context [72]).

4.3.4 The accessioned finds

Nicky Powell

The six accessioned finds from Westminster Hall were assessed. All were examined by eye and the initial identifications revised or amended. The assemblage is too small and disparate to attempt any type of functional analysis. No objects require illustration in any eventual publication.

Table 11 Summary of accessioned finds by material and period

Material	Medieval	Post medieval	Unknown	Note
Copper alloy	2	1		Pin med/post med date
Lead		1		
Bone			1	
Other material			1	resin

4.3.4.1 Medieval

A small globular fragment of copper alloy <2> was recovered from a medieval floor make-up deposit (context [15]). It is probably waste. A pin <3>, complete with wire wound head, came from a post-medieval floor make-up [73]. It may date from the medieval period, but this type of pin had a long period of manufacture and use and may be post medieval in date.

4.3.4.2 Post-medieval

A lace chape <4> was recovered from the foundation of a 17th-century wall (context [86]). It appears complete, with an overlapping seam and finished end. The object needs to be cleaned by a conservator.

A post-medieval floor make-up (context [4]) produced three short twisted lengths of window came <5>. The condition makes it difficult to ascertain form or section.

4.3.4.3 Undated

A small doughnut-shaped bone bead <1> with central perforation was found in the make-up for Smirke's concrete floor of the 1830s (context [72]); the object may well be post-medieval in date.

Context [13] (a post-medieval post-hole) produced two fragments of opaque white and pale green resin <7>.

4.3.5 Clay tobacco pipes

Tony Grey

The clay tobacco pipe assemblage from WME06 was recorded in accordance with current Museum of London practice and entered onto the Oracle database. The English pipe bowls have been classified and dated according to the Chronology of London Bowl Types (Atkinson and Oswald 1969), with the dating of some of the

18th-century pipes refined where appropriate by reference to the Simplified General Typology (Oswald 1975, 37–41). The prefixes AO and OS are used to indicate which typology has been applied. Quantification and recording follow guidelines set out by Higgins and Davey (1994; Davey 1997).

There are eighteen fragments of pipes including one accessioned fragment. They were recovered from four contexts: a detailed breakdown of the assemblage is given in Table 2. The greatest concentration of pipe fragments occurs in context [72] (nine fragments). A lesser concentration occurs in context [7] (seven fragments). Two pipe bowls were recorded, both datable according to current typologies. One pipe shows evidence of maker's marks and is also decorated.

Table 12 Clay tobacco pipe quantification

Total no. of fragments	18
No. of bowl fragments	2
No. of stem fragments	16
No. of mouthpieces	0
Accessioned pipes	1
Marked pipes	1
Decorated pipes	1
Imported pipes	0
Complete pipes	0
Wasters	0
Kiln material fragments	0
Boxes (bulk/accessioned)	0.75 box

One pipe bowl is complete and one broken. There are no complete pipes. Both of the pipe bowls show clear evidence of having been smoked. Apart from a damaged bowl there is little sign of wear or excessive fragmentation. There is evidence of heavy usage on one pipe through smoke staining.

Both clay pipe bowls recovered were made between *c* 1660 and 1910. The earlier pipe from context [72], dated *c*1660-80, is clearly residual as the same context has a Victorian pipe dated 1840-1910. Contexts [4], [7] and [11] have undatable pipe stems. The Victorian pipe bowl from context [72] <6> is marked RG in relief on the sides of the heel. In addition this pipe, probably representing a tavern, is decorated with a barrel in relief, wheatsheaves and bears inscriptions running across the back of the pipe bowl.

The pipes are all of London manufacture. None are imported and only one decorated/marked. The late 17th century pipe has been milled. None have been burnished so they are not of the highest (most expensive) quality. The Victorian pipe has very prominent seams and poor finish.

4.3.5.1 Catalogue of accessioned pipes

One pipe bowl (<6>, [72]) has **RG** relief moulded on either side of heel from type AO33 dated *c* 1840–1910. Additionally, there are names in relief running horizontally across the back of the bowl with some within the barrel decoration. A possible pipe maker is Robert Gardener, 1823, Great Windmill Street (Oswald 1975, 137). The bowl is decorated with wheatsheaves down the front seam of the bowl and with a horizontally placed barrel in relief on the back of the bowl.

4.3.6 Prehistoric flint

Tony Grey

One piece of worked flint was found in a medieval floor make-up layer (context [15]). This was a point worked on the proximal end of a blade, subsequently snapped, in poor quality blackish flint with cortex on the ventral surface. The point was worked by steep retouch across the left side of the dorsal side of the blade tip plus oblique retouch. The piece is residual. The raw material is flawed and the piece was probably discarded as a failure. Dating is uncertain, although there is a reasonable corpus of transitional Neolithic/Bronze Age material from Thorney Island (Thomas et al 2006, 25–8)

4.3.7 The environmental core samples

Graham Spurr

Assessment of the four core samples has shown that are likely to preserve only degraded pollen and diatom assemblages, although these can be useful for documenting the changing landscape and possible human activities on this part of the floodplain. However, as microfossil work has previously been undertaken in this part of Westminster, such evidence must be considered of little significance. Although it is recommended, therefore, that no further work is necessary on these particular cores, they will be held in the MoLAS store until a final decision has been made.

4.3.8 The animal bone

Alan Pipe

Hand-collected animal bone from contexts [4], [5], [7], [15], [22], [32], [52], [54], [72], [73], [84], [86] and [95] was recorded directly onto the MoLAS Oracle 8 animal bone assessment database. Each context group was described in terms of weight, estimated fragment count, species, carcase-part, fragmentation, preservation, modification, and the recovery of epiphyses, mandibular tooth rows, measurable bones, complete long bones, and sub-adult age groups. The assemblage was not recorded as individual fragments or identified to skeletal element. All identifications referred to the Museum of London reference collection. Fragments not identifiable to species or genus level were generally allocated to the approximate categories of ‘ox-sized’ and ‘sheep-sized’ as appropriate.

The assemblage provided 0.760 kg (an estimated 111 fragments) of well-preserved hand-collected animal bone with a minimum fragment size generally greater than 25 mm. The bulk of the group derived from ‘ox-sized’, ‘sheep-sized’ and sheep/goat *Ovis aries/Capra hircus* with smaller numbers of chicken *Gallus gallus*, goose *Anser sp.*, ox *Bos taurus* and pig *Sus scrofa*. These major domesticates were represented mainly by adult upper and lower limb, vertebrae and ribs; all areas of good, and at least moderate, meat-bearing quality, with only minor recovery of head and foot elements, and no recovery of horncores or toes. The assemblage indicates a general interpretation of consumption of chicken and goose with good quality beef, mutton, lamb and pork. Juvenile chicken and goose were recovered from [15]; juvenile sheep/goat from [73]; and juvenile pig from [95]. There were no foetal or neonate

bones. Context [5] also produced a lower limb of adult rabbit *Oryctolagus cuniculus*. Context [22] produced elements of juvenile and adult rat *Rattus sp.*

The group produced 18 epiphyses but no mandibular tooth rows or other dental evidence for age-at-death. There were only two measurable bones but no complete longbones. Clear evidence of butchery was seen on ‘ox-sized’ and sheep/goat bones from [4], and sheep-sized bones from [86]. There was no evidence of gnawing, burning, working of horn or bone, or of intensive local stock rearing.

4.3.9 Conservation

Dylan Cox

The following assessment of conservation needs for the accessioned and bulk finds from the excavations at Westminster encompasses the requirements for finds analysis, illustration, analytical conservation and long term curation. Work outlined in this document is needed to produce a stable archive in accordance with MAP2 (English Heritage 1992) and the Museum of London’s Standards for archive preparation (Museum of London 1999).

One copper alloy item was identified as requiring conservation input to clarify detail and aid identification. No items were identified as requiring conservation input to prepare it for photography. The small finds from this site are appropriately packed for the archive. No further work is necessary for transfer into the archive. There is no remedial work outstanding.

5 Potential of the data

5.1 Realisation of the original research aims

The original research aims for the project (above, 2.2) are listed again below, together with an initial statement of how the excavation data can answer the research questions.

5.1.1 *Natural topography and the prehistoric environment*

1. *At what level does the surface of natural gravel lie?* The surface of the natural sands lies at *c* 0.7m OD. The natural gravels were not seen in any of the augerholes with the possible exception of WS4, where gravel was seen mixed with the sands (at -0.75m OD), indicating the proximity of a gravel surface, perhaps lying at *c* -0.9m OD.
2. *Is there any evidence for prehistoric activity on the site either in the form of features or artefacts?* A single residual worked flint flake was recovered. A fragment of burnt flint was seen in a clay-rich sand horizon at the top of the sands in sample WS1. The burnt flint could well be prehistoric but it was probably washed into the sands and it may not, therefore, be significant.
3. *Is there evidence for the edge of stream channels or any alluviation on the site from the Neolithic or Bronze Age?* There is evidence for an infilled ancient buried channel beneath the southern end of Westminster Hall, although the evidence from the adjacent Cromwell Green site would suggest that it is Roman or early medieval in date.

5.1.2 *Medieval*

4. *What evidence is there for the original floors of Westminster Hall?* The earliest floor surface was a spread of lime mortar.
5. *Can a central hearth be located?* The slightly 'baked' floor make up (for the late 14th-century floor in Trench B) may be evidence for a central hearth under the louver.
6. *What evidence is there for the continued use of the hall?* A sequence of floor layers was archaeologically recorded and there is also evidence for scaffolding presumed to date to the 1390s reconstruction campaign.
7. *Is there any evidence for the king's bench?* One slab of Purbeck Marble (<16>) has a rounded front profile suggesting that it may have formed part of one of the stone benches at the south end of the hall (Courts of King's Bench and Chancery).
8. *Can the stonework used in the 14th-century construction be identified and can structures of furnishings be reconstructed from the evidence?* An area of what might be the late 14th-century floor was recorded and later analysis will reveal the stone type. No other medieval structures or furnishing were recorded.
9. *Were the internal faces of Westminster Hall behind the steps refaced in the 19th century or is there evidence of medieval stonework?* No evidence of the medieval walls was recorded (when the eastern and western 1850s brick 'spine' walls were removed, the 1830s re-facing was revealed).

5.1.3 Post-medieval

10. *What evidence is there for the construction of the steps in the mid 19th-century?* A cross-section of the 1850s steps has been drawn and the steps were also recorded by photographs during their dismantling.
11. *What evidence is there for the construction of the floor in the mid 19th century?* Elements of the 1830s floor were recorded, including remnants of the small ‘sleeper’ walls which partly survived under the 1850s steps.

5.2 General discussion of potential

The various types of archaeological information recovered from the Westminster Hall excavation have the potential to address a number of research areas.

It should prove possible to understand the structure and history of the medieval King’s Table – or plural Tables as we now know – by a full analysis and AutoCAD reconstruction of the fragments, and by a programme of documentary research to elucidate its construction, use and context.

Our understanding of the sequence of historic floors of Westminster Hall has been greatly enhanced by the excavation; little additional analysis beyond the discussion given above (3.5) is required and the results can therefore be published.

Of the *ex situ* artefacts recovered from the excavation, only the stone and ceramic building material have potential to increase our understanding of the hall.

The evidence gathered during the architectural recording of the south steps of the hall adds detail to our understanding of the 19th- and early 20th-century reconstruction and restoration campaigns. Little additional research is required before the findings can be published.

The archaeological and geoarchaeological work (sections 3.2 and 3.4) have revealed that the presence of a filled-in Roman or early medieval channel under Westminster Hall may be the cause of the settlement which formerly affected the hall. In order to understand and illustrate the cause of this settlement of the fabric, it will be important to combine the geoarchaeological data from the Westminster Hall site with that recorded on the adjacent Cromwell Green site (CGW05). Using this combined data it will be possible to refine the previously published topographic model of Thorney Island in this area (Thomas et al 2006, figs 4 and 27).

Given the lack of any organic sediments in the geoarchaeological cores (and the fact that the sediments are well known from previous work in the area), there is no potential for any further analysis on the samples themselves.

6 Significance of the data

The fragments of the King's Table are of national or even international significance as they are a rare surviving part of the fixtures of the medieval Palace of Westminster. The table fragments relate very directly to the palace's dual function as a royal residence (including the setting for coronation banquets) and as a public governmental/judicial complex: this unique attribute of the Palace is rightly highlighted in the Research framework for London archaeology (2002, 62–3).

The other archaeological, architectural and palaeoenvironmental data recovered in the course of the excavation (and summarised above in Section 5.2) are of local if not regional significance because of the widely acknowledged significance of Westminster Hall and the Palace of Westminster, which is classified as a Grade I Listed Building and a UNESCO World Heritage Site.

The consequent analysis and publication proposals are treated in a separate *Updated project design*; it is proposed that the archaeological discoveries made on this site are published jointly with those made in the adjacent excavation carried out on Cromwell Green (site CGW05).

7 Acknowledgements

The authors would like to thank Cliff Cowell of the Parliamentary Works Services Directorate and Dr Mark Collins and Simon Carter of the Parliamentary Estates Directorate for their advice and help. Phil Emery and Jackie Heath of Gifford were, respectively, the project's principal archaeologist and engineer and they both provided expert advice and design input into the various stages of archaeological work. Kelvin Holford and his team at Verry Construction facilitated the archaeological works during the engineering works in the hall. The advice of Dr Rory O'Donnell, Diane Walls and Paddy Elson of English Heritage is also gratefully acknowledged. Charlie North, Kate Stevens and Steve Turner were the MoLAS archaeologists on this project.

8 NMR OASIS archaeological report form

8.1 OASIS ID: molas1-27266	
Project details	
Project name	Westminster Hall south steps restoration
Short description of the project	Dating from the end of the 11th century, Westminster Hall is the oldest building in the Palace of Westminster, which is part of a UNESCO World Heritage Site. The Palace authorities commissioned Gifford to investigate a problem of settlement affecting the floor and stairs at the south end of the hall. The archaeological mitigation, also designed by Gifford to accompany the engineering scheme, included excavation of two trenches within the hall. This was undertaken by archaeologists from MoLAS. The investigations followed discovery of fragments of the medieval King's Table beneath the South Steps, both by Gifford in 2005 and previously by Arnold Taylor in 1960. A total of 12 pieces were excavated in 2006. The table comprised a series of vertical Purbeck marble trestles which would have supported a stone top (not found). Each trestle was delicately carved with a round headed arch and a round column at the front. Given its use for coronations and other ceremonial occasions from the 13th to the 17th centuries, the King's Table is a nationally significant find. Other discoveries include a small area of in situ medieval stone floor, and the foundation for a 17th-century wall to support a raised dais at the south end of the hall (into which the fragments of the broken up table had been incorporated).
Project dates	Start: 15-03-2006 End: 04-05-2006
Previous/future work	No / No
Type of project	Recording project
Site status	World Heritage Site
Current Land use	Other 2 - In use as a building
Monument type	PUBLIC BUILDING Medieval
Monument type	WATER CHANNEL Early Medieval
Significant Finds	FURNITURE, TABLE Medieval
Investigation type	'Part Excavation', 'Watching Brief'
Prompt	Direction from Local Planning Authority - PPG16
Project location	
Country	England
Site location	GREATER LONDON CITY OF WESTMINSTER CITY OF WESTMINSTER Westminster Hall, Palace of Westminster
Postcode	SW1
Study area	1490.00 Square metres
Site coordinates	TQ 3021 7951 51.4990129503 -0.123903768313 51 29 56 N 000 07

	26 W Point
Height OD	Min: 1.75m Max: 2.15m
Project creators	
Name of Organisation	MoLAS
Project brief originator	Gifford
Project design originator	MoLAS
Project director/manager	Chris Thomas
Project supervisor	Nick Holder
Type of sponsor/funding body	Parliamentary Works Services Directorate
Project archives	
Physical Archive recipient	LAARC
Physical Archive ID	WME06
Digital Archive recipient	LAARC
Digital Archive ID	WME06
Paper Archive recipient	LAARC
Paper Archive ID	WME06
Project bibliography 1	
Publication type	Grey literature (unpublished document/manuscript)
Title	WESTMINSTER HALL SOUTH STEPS, PALACE OF WESTMINSTER, LONDON SW1, archaeological post-excavation assessment
Author(s)/Editor(s)	Holder, N.
Date (first draft)	2007
Issuer or publisher	MoLAS
Place of issue or publication	London
Description	bound unpublished MoLAS report
Entered by	Nick Holder (nholder@molas.org.uk)
Entered on	30 May 2007

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