THE GREAT PAGODA, ROYAL BOTANIC GARDENS, KEW, LONDON BOROUGH OF RICHMOND-UPON-THAMES, TW9 3AB
AN ARCHAEOLOGICAL WATCHING BRIEF

LOCAL PLANNING AUTHORITY: RICHMOND-UPON-THAMES

SITE CODE: KEW06

AUGUST 2017

PRE-CONSTRUCT ARCHAEOLOGY

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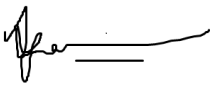
Project Manager Sign-off:	A Fairman		18.7.2017

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THE GREAT PAGODA, ROYAL BOTANIC GARDENS, KEW, LONDON BOROUGH OF RICHMOND-UPON-THAMES TW9 3AB

AN ARCHAEOLOGICAL WATCHING BRIEF

HRP Site Code:	**KEW06**
Central National Grid Reference:	**TQ 18471 76076**
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CONTENTS

APPENDICES

ILLUSTRATIONS

1 ABSTRACT

1.1 Pre-Construct Archaeology Ltd. conducted an archaeological watching brief during the renovation works of The Great Pagoda at Royal Botanic Gardens, Kew TW9 3AB between the 6th February and 6th March 2017. The excavations consisted of two concentric octagonal installation trenches for concrete ring beams (Outer Ring and Inner Ring), and a small trench against the outside of the west facing Pagoda door for access to services (Service Trench). This scheme of work represents the fourth phase of evaluation at the subject site and supplements previous reports (Haslam, 2016).

1.2 The earliest horizon encountered in both octagonal trenches comprised natural gravely sand. The Inner Ring showed several layers of redeposited sand within which were several deposits of building material suggesting this was the working area during the erection of The Great Pagoda. There were several different bedding layers underneath the flagstones around the base of the Pagoda, which combined with the flagstones showing several engraved numbers on their reverse sides, suggested that many of the flagstones had been re-laid over time.

1.3 The Outer Ring revealed several layers of ground raising and levelling relating to landscaping of the garden, along with a small number of cut garden features and deposition of brick rubble. Two spreads of brick rubble appeared to align with the Cedar Vista and Pagoda Vista suggesting that these vistas were used for transporting materials to the Pagoda during construction. A previous pathway was seen along the inner edge of the outer ring between 0.13m and 0.19m BGL and correlates with findings from the Phase III evaluation.

1.4 The Service Trench contained the same sequence of deposits as the Inner Ring comprising redeposited sand. This was truncated by modern service ducts through the substantial masonry foundation wall of The Great Pagoda.

1.5 Four phases of activity were identified during this phase of works. These related to natural horizons (phase 1), garden features and levelling immediately prior to and contemporary with the construction of the Pagoda (phase 2: 18th century) and features associated with modification to the Pagoda and surrounding gardens (phase 3: late 18th to early 19th century). The sequence was capped by modern material associated with 20th/21st century ground levels. No archaeological features or horizons pre-dating the post-medieval period were recorded.

2 INTRODUCTION

2.1 Between the 6th February and 6th March 2017 Pre-Construct Archaeology Ltd. (PCA) carried out an archaeological watching brief at The Great Pagoda, Royal Botanic Gardens, Kew TW9 3AB (Figure 1).

2.2 The watching brief was primarily concerning the installation trenches for two octagonal concrete ring beams which will support a scaffolding structure required for the renovation work of The Great Pagoda, in addition a small exploratory trench was excavated against the outside of the west facing doorway to establish the extent and depth of modern service ducts which carry electricity cables into the Pagoda.

2.3 The archaeological work was commissioned by Historic Royal Palaces, and comprised the hand excavation of the inner of the two octagonal trenches and the exploratory trench (Inner Ring and Service Trench respectively, see Figure 2), and the machine excavation of the outer of the two octagonal trenches (Outer Ring, Figure 2). The Outer Ring was excavated in an octagonal pattern 0.80m wide and to a maximum depth of 1.10m below ground level (BGL), spanning the interface between the resin-bonded gravel path and the open lawn area. The Inner Ring measured 0.70m wide and was excavated to a maximum depth of 0.90m BGL within the flagstone paved area below the canopy of The Great Pagoda.

2.4 The site is located at National Grid Reference (NGR) TQ 18471 76076

2.5 The project was monitored for the client by Patricia Les (Head of Building Conservation - Historic Royal Palaces) and Rob Umney (Conservation Building Surveyor – Historic Royal Palaces). The archaeological watching brief was managed for PCA by Tim Bradley and supervised by Stacey Amanda Harris.

2.6 The works followed the methodology detailed in an approved Brief for Archaeological Investigations and Watching Brief (Stevenson 2016).

2.7 The site archive will be deposited with the Historic Royal Palaces archive at Hampton Court under Site Code KEW06 as issued by Historic Royal Palaces.

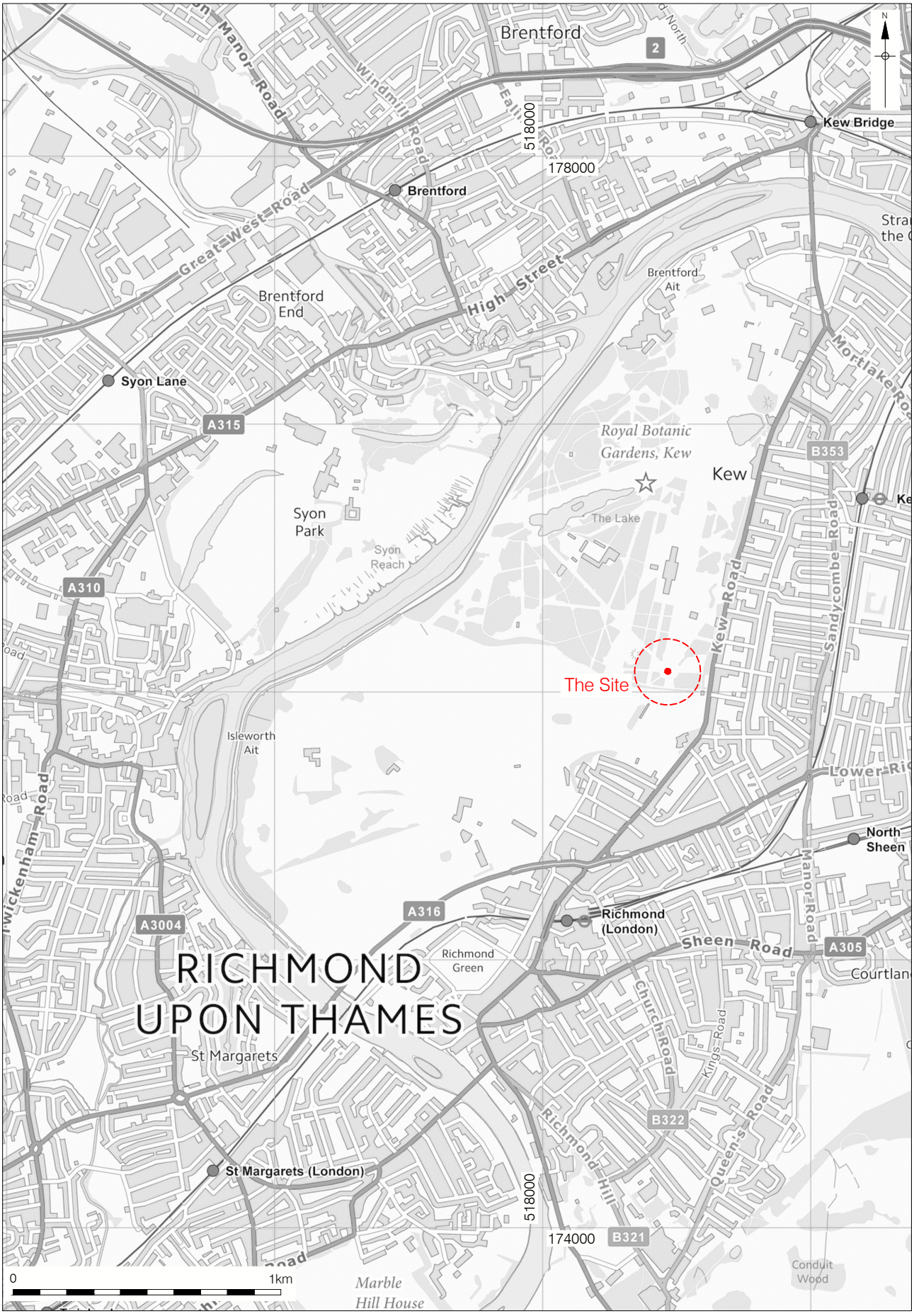

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Figure 1
Site Location
1:20,000 at A4

3 PLANNING BACKGROUND

3.1 On the 27th of March 2012 the Department for Communities and Local Government issued the National Planning Policy Framework (NPPF). Section 12 of this policy framework is entitled 'Conserving and Enhancing the Historic Environment' and replaces Planning Policy Statement 5 (PPS5), which had previously been adopted in March 2010. PPS5 replaced the earlier Planning Policy Guidance Note 16 (PPG16). As such, Section 12 provides guidance for planning authorities, property owners, developers and others on the preservation and investigation of archaeological remains.

3.2 In considering any planning application for development, the local planning authority will be guided by the policy framework set by government guidance, in this instance NPPF Section 12, by current Structure and Local Plan policy and by other material considerations.

ARCHAEOLOGY IN THE LONDON BOROUGH OF RICHMOND UPON THAMES AND THE DEVELOPMENT MANAGEMENT PLAN

3.3 The relevant Local Development Framework is provided by the Development Management Plan which was adopted in November 2011. This plan contains policy statements in respect of protecting the buried archaeological resource. The site is subject to the Council's Archaeology Policy:

Policy DM HD 4

Archaeological Sites

The Council will seek to protect, enhance and promote its archaeological heritage (both above and below ground), and will encourage its interpretation and presentation to the public. It will take the necessary measures required to safeguard the archaeological remains found, and refuse planning permission where proposals would adversely affect archaeological remains or their setting.

4.3.18 Archaeology can include industrial sites, buildings, machinery, artifacts, air raid shelters and modest domestic buildings. The preservation of archaeological remains is a material consideration when determining planning applications. As set out in PPS 5, there is a presumption in favour of preservation in-situ, where the remains are of national importance. While it is desirable to treat all remains in this manner, it is recognised that it may not always be practical to do so.

4.3.19 However, regardless of their status, established procedures of consultation and evaluation as set out in PPS 5 and other advice must be followed in preparing development proposals. Prospective developers should make an initial assessment of

whether the site is known or likely to contain archaeological remains by consultation with the appropriate specialist bodies, normally English Heritage and the Greater London Archaeological Advisory Service. The Proposals Map identifies scheduled ancient monuments. The Archaeological Constraints map (Map 1) identifies areas with archaeological potential where sites of importance could exist, but not all sites of archaeological importance will necessarily be on the constraints map; developers should check the latest known information with English Heritage.

4.3.20 The Council wishes to endorse the spirit of the Code of Practice already established by The British Archaeologists and Developers Liaison Group and developers are also referred to advice published by English Heritage.

3.4 The Pagoda itself is a Grade 1 Listed Building and is therefore subject to the Council's policies regarding Listed Buildings and Scheduled Ancient Monuments:

Policy DM HD 2
Conservation of Listed Buildings and Scheduled Ancient Monuments
The Council will require the preservation of Listed Buildings of special architectural or historic interest and Ancient Monuments and seek to ensure that they are kept in a good state of repair by the following means:

1. consent would only be granted for the demolition of Grade II Listed Buildings in exceptional circumstances and for Grade II* and Grade I Listed Buildings in wholly exceptional circumstances following a thorough assessment of their significance;

2. retention of the original use for which the listed building was built is preferred. Other uses will only be considered where the change of use can be justified, and where it can be proven that the original use cannot be sustained;

3. alterations and extensions including partial demolitions should be based on an accurate understanding of the significance of the asset including the structure, and respect the architectural character, historic fabric and detailing of the original building. With alterations, the Council will normally insist on the retention of the original structure, features, material and plan form or features that contribute to the significance of the asset. With repairs, the Council will expect retention and repair, rather than replacement of the structure, features, and materials of the building which contribute to its architectural and historic interest; and will require the use of appropriate traditional materials and techniques;

4. using its legal powers to take steps to secure the repair of Listed Buildings,

where appropriate;

5. **protecting the setting of Ancient Monuments and Listed Buildings where proposals could have an impact;**

6. **taking a practical approach towards the alteration of Listed Buildings to comply with the Disability Discrimination Act 2005 and subsequent amendments, provided that the building's special interest is not harmed, using English Heritage advice as a basis.**

3.5 Since 2003 the Royal Botanic Gardens at Kew have been classed as a Unesco World Heritage Site:

Policy DM HD 5

World Heritage Site

The Council will work with others, to protect, promote, interpret, sustainably use, conserve and where appropriate enhance the Royal Botanic Gardens Kew World Heritage Site and its setting including the buffer zone by conserving its Outstanding Universal Value, integrity, authenticity and significance. Development proposals should not cause adverse impact to the World Heritage Site or its setting that would compromise its Outstanding Universal Value, integrity, authenticity and significance, and give appropriate weight to the World Heritage Site Management Plan.

4.3.21 The Royal Botanic Gardens Kew was inscribed on the UNESCO World Heritage Site List in 2003, in recognition of its outstanding and internationally significant universal value. In accordance with Planning Policy Statement 5: Planning for the Historic Environment (2010), the outstanding international importance of the World Heritage Site is a key material consideration to be taken into account by the Council when determining planning applications and listed building consents. The site should be protected for the benefit of future generations and development proposals affecting the site or its buffer zone will require careful scrutiny for their likely effect on the site or its setting.

4.3.22 The Royal Botanic Gardens, Kew World Heritage Site Management Plan (2003) and subsequent updates provides a framework for the activities that take place in the site whilst ensuring that these activities do not conflict with the need to protect the qualities which make Kew Gardens such a special and unique place.

3.6 The Royal Botanic Gardens comprise Conservation Area 63, as designated by the London Borough of Richmond upon Thames.

4 GEOLOGY AND TOPOGRAPHY

4.1 The Geological Survey of Great Britain (South London – Sheet 270) shows the site as lying upon Quaternary River Terrace 1. These gravels were most probably deposited during the Saalian or Wolstonian stadial between 380,000 and 130,000 BP. They are often capped by alluvial deposits along with Aeolian or wind-blown sandy brickearth.

4.2 The Pagoda is situated within the south-eastern corner of Kew Gardens, a relatively flat parcel of land which is cradled in a wide meander of the River Thames. The area has been cultivated for almost 300 years as a botanical and ornamental garden, with the gardens themselves comprising paths, listed buildings, glasshouses and modern structures in the form of laboratories and amenities.

5 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

5.1 **Prehistoric**

5.1.1 The early environment of the Thames Valley is well researched, principally due to the preservation of extensive undisturbed deposits. This has established that following the retreat of the ice sheets some 13,000 years ago, the Thames formed a braided river system with tundra-type vegetation which gradually yielded to colonisation by herbaceous plants and grasses on an open steppe. It was at this point that the first Palaeolithic hunters probably began to exploit the area, although evidence for the period is problematic. Many finds, which exclusively comprise stone tools, are often found as redeposited material, while the brickearth deposits over much of the area post-date the period and have thus obscured almost all primary contexts. A single flake has been recovered to the east within the Royal Botanic Gardens, but remains the only point of reference for a wide area.

5.1.2 The Mesolithic period (*c.*10,000-7000 BC) was probably one of greater activity. Pine and birch forests appeared, followed by mixed deciduous woodland as the climate became warmer. Mesolithic people hunted extensively along the Thames but lived an itinerant lifestyle. This nomadic movement coupled with a small population has left only the most ephemeral evidence. Occupation evidence is known from High Street, Brentford, with a flint-working site at Kew Bridge, but no evidence has been found within the immediate area of the site.

5.1.3 Along the Thames, the Neolithic period (7000 – 2500 BC) is characterised by a decline in elm and other woodland species coupled with an expansion of cereal cultivation, suggesting that localised areas were cleared for permanent occupation and agriculture. The wide meander which the Royal Botanic Gardens occupies is practically devoid of sites, although occupation is attested in Brentford and stone tools have been recovered at Kew Pond and from the river at Kew Bridge.

5.1.4 Cultivation and development seems to have continued or even expanded into the Bronze Age, with the extensive utilisation of the river environment for food, transport and even for religious or ritual purposes. The earliest surviving evidence of permanent landscape features in the area have been dated to this time, although are confined to the north of the river. Scattered pottery to the east suggests that some occupation took place, while a founders' hoard to the south and implements to the east indicate that there is still much to be found from the period.

5.1.5 The Iron Age (c.700 BC – 1st century AD) is poorly known throughout the London region, and corresponds to a regeneration of some woodland species in the pollen record. Environmental evidence is still under-represented but it has been suggested that frequent and extensive inundation by the Thames discouraged or even drove off any pre-existing occupation in the area. A few ditches and pits have been discovered during evaluations to the north of the river, but otherwise the record is practically blank.

5.2 **Roman**

5.2.1 Roman London is perhaps one of the best-known urban areas of the Roman Empire, yet even at a slight distance from the city walls the archaeological evidence diminishes. The heavy clays probably discouraged agriculture and large settlement, although extensive woodland may also be inferred by the widespread presence of tile and pottery manufactories which needed almost inexhaustible supplies of wood for charcoal. Immediately to the north of the river the road from *Calleva* (Silchester) to London was laid out in the 1st century, and roadside settlement in one form or another would be expected. Such settlement appears largely absent however. Even casual finds of scattered pottery or coins are not widely distributed across the western part of Greater London, suggesting a general paucity of activity.

5.3 **Saxon**

5.3.1 When the region emerges into the historical record in the 7th century a series of large rural estates can be discerned, peppered with royal or ecclesiastical centres of some importance. These large vills often formed the basis for later expansion into towns and cities. The lands around Kew formed part of the great royal estate of Kingston, although archaeological finds in the vicinity have illuminated the earliest Saxon development in the area. A collection of 6th or 7th century weapons has been recovered from the Thames at Brentford, which probably lay at the first fording site up-river from the City. Scramasaxes and swords, spears, a shield boss and other items form part of a highly important assemblage for the region, though the collection was discovered in the 19th century and its context is lost. At Strand-on-the-Green to the north of Kew Bridge, pottery has been found, while axes and spears have also been recovered from the Thames at the bridge site.

5.4 **Medieval**

5.4.1 From its earliest records, Kew or Cayho (from the Old English: a neck of land by a landing place – Weinreb *et al* 2008, 456) lay within the great royal patrimony of Kingston, which also included Maldon, Thames Ditton, Richmond and Petersham. Though it may have been an early estate, no village or nucleated settlement is recorded until after the 14th century, reinforcing its primary agricultural, and peripheral nature. Field names in the area suggest the existence of heath and woodland, although a survey of the manor of Sheen taken in 1314 (PRO SC11/638) records large messuages or properties owned by tenants such as Richard of Cayho, Alice of Cayesho and John le Clerke of Cayesho, suggesting that a pattern of dispersed farmsteads or a small, discrete hamlet was in existence at this time. A short distance to the south, the royal palace of Sheen was to spring up in the 14th century, followed shortly by a Carthusian monastery, which in turn meant a substantial development of the landscape with deer parks and the squeezing of the agricultural land available for local farming tenants.

5.5 **Post-medieval**

5.5.1 The proximity of Kew to Sheen and the Court meant that it became fashionable as a place of residence for the nobility, reinforced by the convenience of the river as the main route of transportation. Princess Katherine, daughter of King Edward IV (1461-1483) is the first notable person recorded as living at Kew, and many others followed.

5.5.2 It seems that houses were built as part of a speculative venture. One Thomas Byrkes divided a freehold into small plots for sale, and even sponsored the licensing of a chapel of ease for local, more convenient worship. Thereafter a number of prominent residences, all ringing the river devolved into the hands of noble families or individuals, including the Earls of Devon, Henry Norris, John Dudley and Charles Brandon, Duke of Sussex, with his wife, Mary, widow to King Louis XII of France.

5.5.3 The tenure and development of these properties is complex, and has not been completely deciphered (Cloake 2001), as many disappeared into obscurity within a relatively short space of time. Several survived however, and Kew itself continued to develop, even after the destruction of Richmond Palace and the monastery. Several families of note, including the Portman family built up consolidated estates from the various fragmented land-holdings, and the purchase of a lease by Queen Caroline in 1729 gave Kew a new social cachet which ensured success and development.

5.5.4 The subsequent development of the gardens is attested as early as 1678 when John Evelyn mentioned both the orangerie and myrtetum whilst visiting Sir Henry Capel (Weinreb *et al* 2008, 711). It was however under Frederick, Prince of Wales, and his wife Augusta that the gardens really began to evolve. In 1731 Frederick leased the White House and the grounds from the Capel family, an area which forms the northern part of the present gardens. He introduced a pleasure garden to the grounds and following his death Augusta continued with further improvements. Under the guidance of Lord Bute and the head gardener, William Aiton, she created a botanic garden of 9 acres in 1759 (Weinreb *et al* 2008, 711). The successors of Frederick and Augusta ensured the continuing prosperity of Kew in the 18th century, both as a place of recreation and an aristocratic residence. The Green developed, and became popular with French émigrés after the French Revolution, developing into an idyllic village environment, which was greatly favoured by George III and his consort Queen Charlotte. Kew itself, always an adjunct of Richmond and Kingston was finally made into a separate parish in 1769.

5.5.5 The western part of the gardens was attached to the now vanished Richmond Lodge, a residence of George II and the grounds had been laid out by his wife, Queen Caroline under the guidance of Charles Bridgeman. At around *c.* 1770 the grounds of the lodge were altered and improved by Lancelot 'Capability' Brown after the property had passed to George III. It was under George II that the Lodge grounds and gardens were united (Weinreb et al 2008, 711). The abandonment of Kew as a royal residence after 1818 resulted in a certain level of decline which, coupled with the rise of industrial blight in nearby Brentford, meant that the gardens were all but abandoned by the 1830's. In 1840 the gardens were handed over to the nation as a result of a Royal Commission which led to the establishment of the Royal Botanic Gardens (Prosser 2013, 9). The gardens were opened

to the public in 1899 by Queen Victoria. The last quarter of the 19th century also witnessed an unprecedented expansion of suburban development at the fringes of the gardens, with the arrival of the railway, and the development of suburban life as London expanded to incorporate the formerly rural parish. In 2003 the gardens were designated as a World Heritage site by UNESCO.

5.6 **The Great Pagoda**

5.6.1 Based upon the Porcelain Pagoda at Nanking (Prosser 2013, 25), the Great Pagoda at Kew was designed by Sir William Chambers and was constructed within 6 months during the winter of 1761-1762 (Prosser 2013, 26). Construction of the building itself is likely to have been funded from the privy purse of Princess Augusta or of the King himself (Prosser 2013, 16) and according to Horace Walpole cost £12,000 (Prosser 2013, 26). Despite the importance of pagodas within Taoist and Buddhist theology, in Europe these structures came to represent the exotic nature of East Asia and were erected as ornamental buildings in the 'Chinoiserie' style. The Great Pagoda at Kew is no exception and was built as a folly; designed to amuse the eye, reflect the sophistication of royal patronage and to act as a prospect tower which afforded dramatic views from the top (Prosser 2013, 4).

5.6.2 The Pagoda is constructed of brick on an octagonal profile, rising through ten stories to a finial at a height of 163 feet (50m). It is punctuated at each level by glazed doors and timber balconies beneath roofs of grey slate. The brickwork is all by the noted bricklayer Solomon Brown, laid in a Flemish bond of yellow/pink fabric with fine Georgian struck jointing. The lowest roof is slightly swept at the eaves, and is supported by a colonnade of 24 slender columns. The Pagoda sits on a large plinth of radiating Portland flags, and was once raised as a single step from the surrounding area (Prosser 2013, 11).

5.6.3 When first built, the Great Pagoda is believed to have been roofed with glazed or enamelled iron slates, with a total of 80 gilded or painted iridescent dragons individually positioned at the hips of each roof (Prosser 2013, 26). One of the earliest depictions in painting also suggests that balustrade was painted white. Change appears to have occurred quickly however, and in 1784 a coppersmith and tiler were employed to slate the roofs. It may have been during this episode of renovation that the dragons were removed (Prosser 2013, 26). Notably in February 1789 King George III, whilst suffering from his illness, attempted to ascend the Pagoda and had to be forcibly restrained by his attendants from doing so (Prosser 2013, 26).

5.6.4 Following the death of George III in 1820 the Pagoda, along with the rest of the estate was neglected. By the time the Royal Botanic Gardens were established in 1840 it was in desperate need of repair. The architect, Decimus Burton, who was working on the Palm House at the time, drew up a number of sketches and proposals, yet the estimated cost of £3,500 was deemed too dear. Some work was clearly undertaken however, as analysis of the paint suggests that it dates to this period and technical analysis implies that at least the lower two roof tiers were substantially reconstructed in the mid 19th century (Prosser 2013, 27).

5.6.5 The Pagoda was repainted in 1895 and the terminal pole was replaced in 1915. It was during this period that most of the existing red and vermilion colour schemes were first applied. During the Second World War permission was granted for the Royal Aircraft Establishment Armament Research Department to conduct model bomb dropping experiments. Holes were cut in each floor in order to facilitate the dropping of test bombs into a box of sand at the base of the tower. Research was completed in 1945 and the building was returned to the Royal Botanic Gardens. The building is believed to have again been repainted in 1953. In 1978 the Pagoda was again the subject of a restoration project but the plans did not proceed and a new coat of paint was deemed sufficient (Prosser 2013, 28). Although the building was accessible during 1960's and 1970's it has been largely closed since the 1980's. In 2006 it was briefly opened to the public during the summer season but has not been so since (Prosser 2013, 13).

6 ARCHAEOLOGICAL METHODOLOGY

6.1 Due to the archaeological importance of the area it was decided by Historic Royal Palaces (HRP) Curators that during the installation of foundation trenches to support the scaffolding an archaeologist be present and undertake a watching brief of the works. All aspects of the work followed national (CIfA 2014) and local (GLAAS 2015) guidelines, complied with PCA's own fieldwork manual (Taylor and Brown 2009) and followed the instructions contained within the HRP Brief for Archaeological Investigations and Watching Brief (Stevenson 2016).

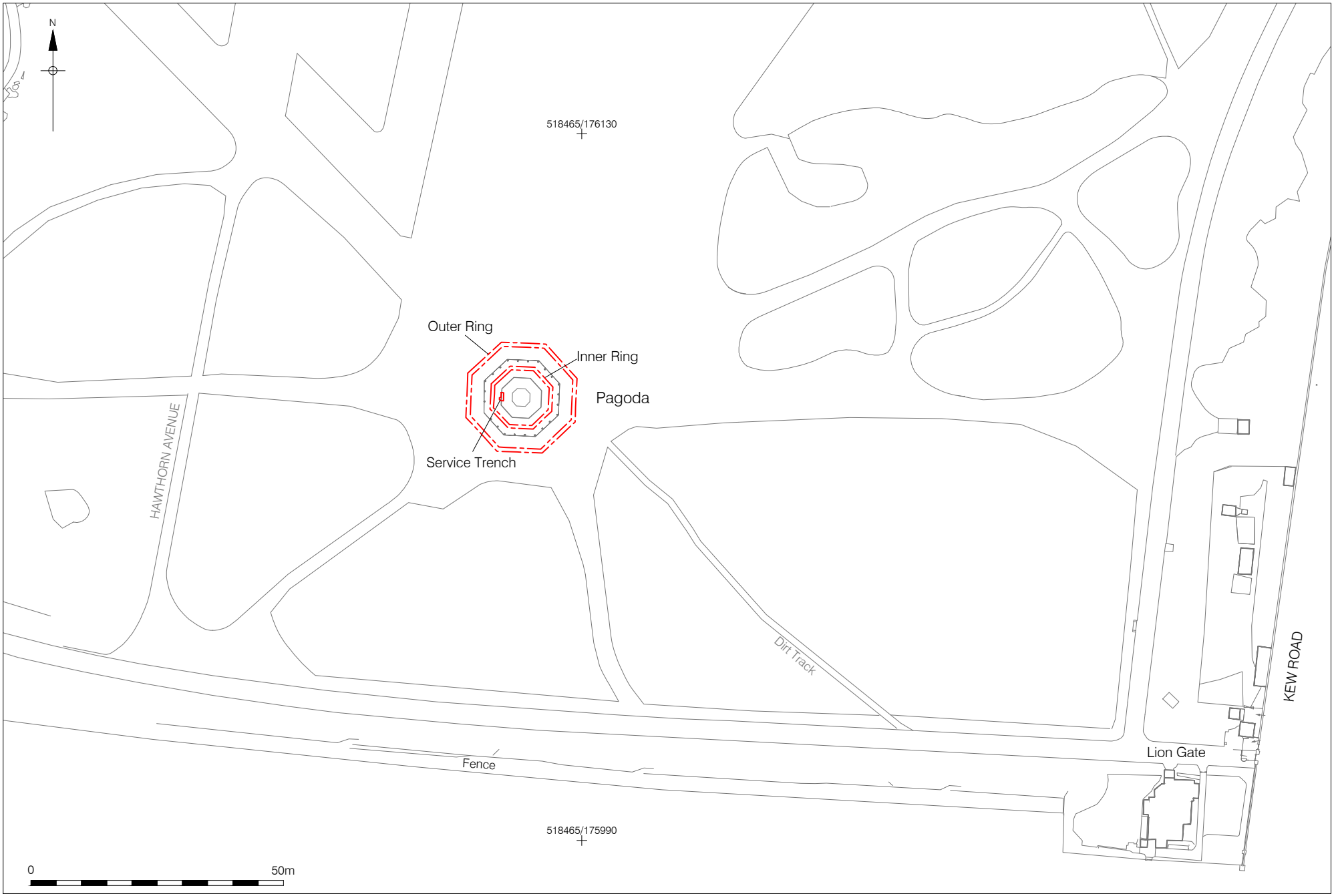
6.2 The areas of excavation comprised two octagonal trenches (Outer Trench and Inner Trench) for the installation of the concrete ring beams and an irregularly shaped exploratory Service Trench (Figures 2 and 3).

6.3 The Inner Ring was located within the paved area, between 1.43m and 2.13m away from the ground floor walls of the Pagoda. This trench required the removal of a large number of flagstone slabs and was excavated to a depth of 0.90m BGL.

6.4 The Outer ring was positioned over the interface between the bonded resin pathway and the lawn area between 6.06m and 6.86m from the ground floor walls of the Pagoda and excavated to a depth of 1.10m BGL. This trench was not included within the HRP Brief (Stevenson 2016), but it was determined that archaeological observation would be beneficial to the understanding of the site. Two sides of the Outer Ring were not watched; these were the eastern and south eastern sides (sides C and D) as it was considered that observing these two sides would not further understanding of the site.

6.5 The Service Trench excavated against the outside of the western entrance to the Pagoda measured 1.58m N-S by 0.82m E-W and was excavated to a maximum depth of 0.58m BGL. This trench was also not included within the HRP Brief (Stevenson 2016), but was included to further understand the site.

6.6 Where safe to do so, trenches were hand cleaned, before being hand planned at a scale of 1:100 and sections at a scale of 1:10. The features that they contained were recorded on pro forma context sheets and a full digital photographic record was compiled. Trenches were located using site location plans (Figure 3).



Survey Provided by Client

18/04/17 CF

Figure 2
Trench Location
1:1,000 at A4

7 EVALUATION RESULTS AND PHASED ARCHAEOLOGICAL SEQUENCE

7.1 Phase 1: Natural

7.1.1 The earliest deposit recorded was a firm, mid yellow orange gravely sand [14] in both Inner and Outer rings. This layer within the inner ring was seen in sides B, C and D (Plate 1), whilst in the outer ring it was seen in sides B (Plate 2), E, F and G. This layer is relatively level, between 0.85m and 1.00m BGL where seen and it can be assumed that this layer continues to the north east below the limit of excavation (LOE).

Outer Ring

7.2 Phase 2: 18th Century

7.2.1 Cutting into the natural layer [14] within the Outer Ring were two very small linear features [31] (Figure 3) with concreted orange brown edges containing a firm yellow grey silt [30] (Plate 3). Whilst there were no artefactual remains within these features there were rare inclusions of CBM/brick and charcoal flecking.

7.2.2 Sealing this was a layer of brown orange silty sand [13] (Plate 2) extending across the entirety of the Outer Ring at a depth of between 0.33m and 0.55m BGL. With occasional rooting and frequent charcoal flecking this layer was interpreted to be the in situ garden subsoil.

7.2.3 Truncating layer [13] were two garden features [21] (Plate 4, Figure 5 Section 5) in side H, and [29] (Plate 5, Figure 5 Section 8) in side G (Figure 3). Both features were irregular in shape and had been backfilled with a mixed brick rubble fill containing brick fragments. Feature [21] filled by [20] also contained frequent chalk fragments, occasional coal and charcoal fragments, pieces of slag, CTP, iron nails, a fragment of 18th century glass and a naturally polled sheep skull. The fill extended substantially deeper than [29], and continued beyond the LOE at a depth of 1.10m BGL. Dating from the brick and CTP fragments infer a 17th to 18th century date of deposition.

7.2.4 Cut [29] was filled by [28], which comprised brick rubble containing occasional gravels and was recorded with a maximum thickness of 0.43m. The type of fill within these features is suggestive of a backfilling event, most likely landscaping in the area contemporaneously with the construction of the Pagoda.

7.3 Phase 3: Late 18th to Early 19th Century

7.3.1 Layer [26] to the northwest of the Pagoda appeared to represent levelling and landscaping post construction of the Pagoda (Plate 4), and contained occasional inclusions of CBM, brick and chalk fragments, and charcoal flecking, plus rare fragments of green slate.

7.3.2 Cutting layer [26] was a 0.25m deep trench [23] (Plate 4, Figure 5 Section 5) containing fill [22] within which was not only inclusions of CBM, brick, chalk and charcoal flecking but also what appeared to be the continuation of the lightening conductor seen within the Inner Ring (contexts [34] [35]).

7.3.3 Two spreads of building material [10] were found, one within side H (Plate 6) and the other on the corner between sides A and B (Figure 3 and Figure 5 Sections 5 and 6). Both spreads of deposit continued beyond the outer and inner LOE's of the Outer Ring and appeared to be on an alignment from the Pagoda with the Cedar Vista to the northwest and the Pagoda Vista to the north. Their location and composition of crushed brick and mortar suggests that these may well have formed pathways to the Pagoda possibly of utilitarian function during later works on the Pagoda. Without further excavation, it is difficult to ascertain their true purpose.

7.3.4 Around the inner edge of the Outer Ring, and continuing beyond the inner LOE was a deposit of made ground [12] (Plate 5, Figure 5 Section 8). This layer measured between 0.05m and 0.19m in thickness and contained occasional green and purple slate along with rare gravels, pot, a post medieval glass fragment and a piece of worked marble (most likely a cornice) with lenses of purple red brick dust. This layer appears to be associated with the construction of the Pagoda, most likely part of a post construction levelling activity. This layer was overlain by [11], a 0.15m thick layer of mid brown sandy silt with no artefactual remains. This darker material is most likely buried topsoil from when the area around the Pagoda was lawn (Plate 21).

7.3.5 A thin 30mm thick layer of mid orangey pink sandy gravel [25] (Figure 5 Sections 6 and 8) was seen around the inner edge of the Outer Ring on sides F, G and H. This layer represents the gravelled pathway around the Pagoda and was also seen during Phase III Archaeological Evaluation (Haslam 2016).

7.3.6 Against the outer edge of the Outer Ring was a layer of buried topsoil [15] (Plates 6 and 4, Figure 5 Section 5), the depth of which corresponded with the remnants of gravel surface [25] suggesting that this layer was the lawn area surrounding the Pagoda at that time, which had subsequently been buried.

7.4 **Phase 4: Modern**

7.4.1 Overlying gravel layer [25] within the Outer Ring (Plate 5, Figure 5 Section 8) was a more substantial 90mm thick layer of gravely sand which appeared to be ground raising perhaps associated with the levelling prior to the modern tarmac surface was installed.

Inner Ring and Service Trench

7.5 **Phase 2: 18th Century**

7.5.1 Overlying the natural [14] within the Inner Ring was levelling layer [36]. This 0.12m thick layer of silty sand contained occasional charcoal and building material (BM) flecking. This layer was only seen within sides B and C of the Inner Ring and may relate to an earlier phase of garden landscaping (Plate 7).

7.5.2 Sealing layer [36] was [19], a layer of redeposited silty sand up to 0.35m thick which was seen across the entirety of the Inner Ring at a depth of between 0.44m and 0.70m BGL. Clay tobacco pipe (CTP) fragments give this layer a date within the 18th century.

7.6 **Phase 3: Late 18th to Early 19th Century**

7.6.1 Overlying layer [19] were several deposits of pale grey white and pale yellow mortar [18] (Plate 8), [27], [32] (Plate 9), [33], [39] (Plate 10), [40] and [41], with occasional to rare inclusions of gravel and flint including fire cracked flint (FCF) pieces. These deposits were all located at the corners between the straight sections of the trench (Figure 3), they appear to be the remnants of the slacking process for lime mortar (English Heritage 2012, pg76), and most likely where the lumps of unslacked lime were left. A brick fragment inclusion within [33] was dated to the late 18th century adding support to this hypothesis.

7.6.2 Sealing these deposits was a further layer of redeposited silty sand [16] (Plates 7 and 11). This layer contained occasional CTP with rare ceramic building material (CBM), oyster shell, a cattle phalange, small fragments of both green and purple slate, and stone fragments and was also seen within the Service Trench showing this layer extended in this area up to the wall of the Pagoda (Figure 4 and Figure 5 Section 14). Along with the inclusions of stone fragments within [16], a larger piece of flagstone [17] was found at the interface between [16] and the layer above [2], this suggests that the flagstones were being worked on site at the same time as this area was being backfilled.

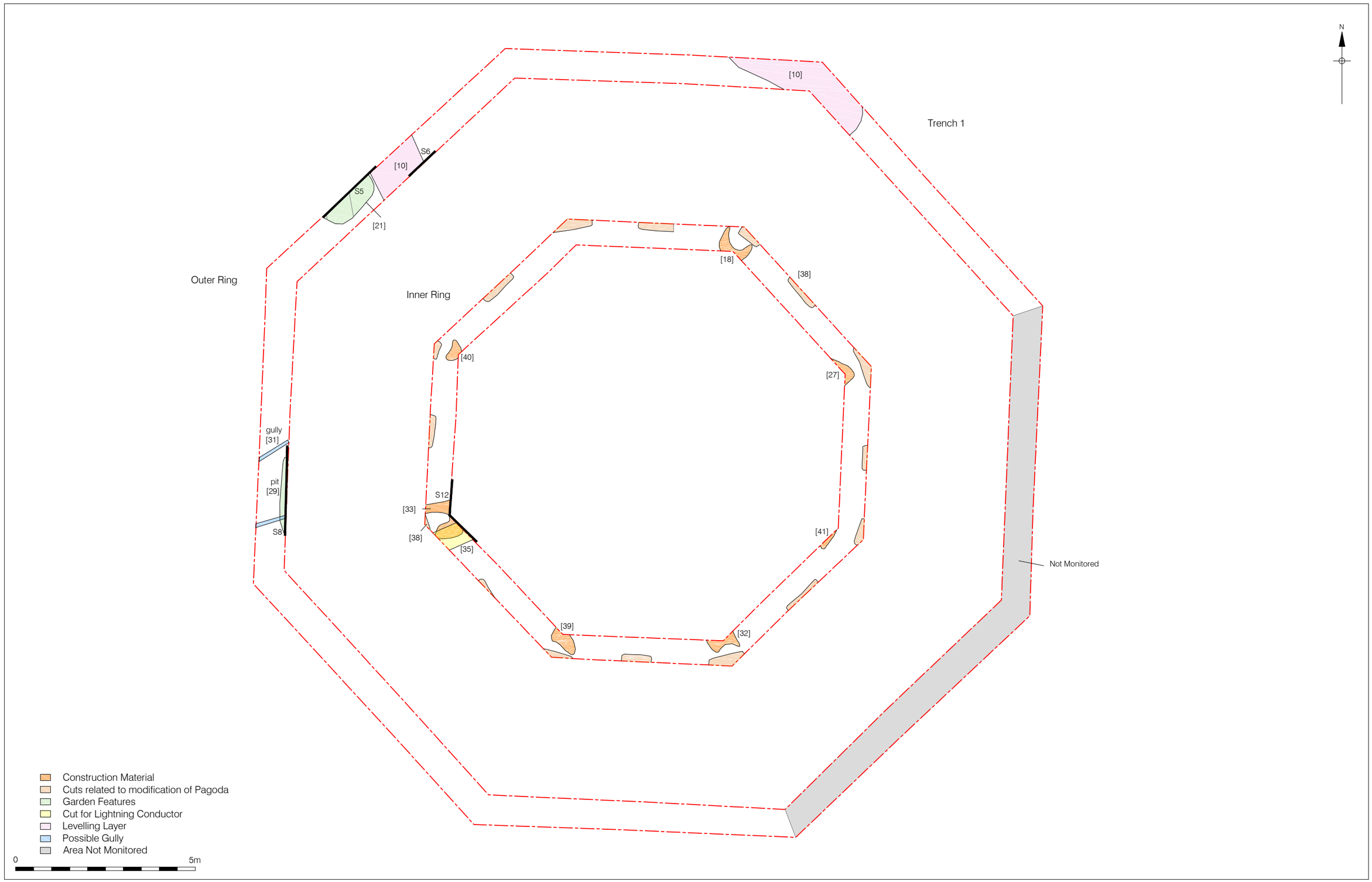
7.6.3 A northeast-southwest cut [35] was seen in side F of the Inner Ring (Plate 12). This linear contained the copper lightening conductor of the Pagoda within fill [34] which also contained frequent stone fragments and flecking of building materials.

7.6.4 Overlaying this was a layer of mid brown orange sand [2] (Plate 13) between 50mm and 140mm thick. Containing occasional CTP fragments, purple and green slate fragments, pottery fragments, CBM fragments, animal bones including sheep/goat scapula and pieces of fire cracked flint, this layer is the oldest of the bedding layers for the flagstone surface and appears to extend across the entire paved area (Figure 4 and Figure 5 Section 14). Dating from the CTP (1700-1740) supports the latter hypothesis. The upper surface of [2] was identified between the 50mm BGL and 110mm BGL, but this variation is mostly due to intrusion caused by the relaying and rebedding of a large number of the slabs within the paved area.

7.6.5 Truncating [2] were a series of regularly spaced cuts [38] (Figure 3) containing loose rubbly sand [37] with inclusions of brick fragments, stone pieces, occasional slate fragments, a fragment of mid 17th C. glass and plant roots (Plate 14). Due to the limits of excavation only the inner edges of these features were seen, they appeared to vary in size quite markedly from 0.50m to 1.20m wide. On some edges a dark stain was witnessed, suggestive of a decayed wooden lining or the presence of shoring (Plate 15).

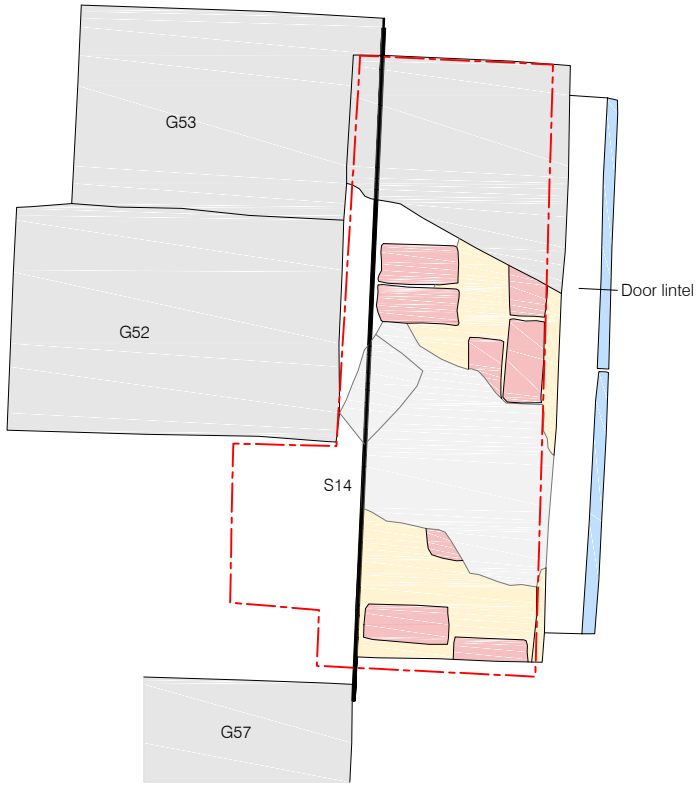
7.6.6 Within the Inner Ring there was evidence that the flagstones had been rebedded on numerous occasions, made evident by the different bedding layers and that a large number of the flagstones had numbers engraved on their reverse sides, some with several different numbers (Plate 16, 17, 18, 19 and 20). The later bedding layers varied greatly, from friable sandy mortars [3], [6] and [7], to concreted sandy resin [8], also cement based mortars [1], [5] and [9] and a lime mortar [4]. Due to the lack of artefactual remains within these bedding layers they cannot be dated, although we

know that on numerous occasions the flagstones have been lifted for repair and service installation from the erecting of the Pagoda until the modern day.



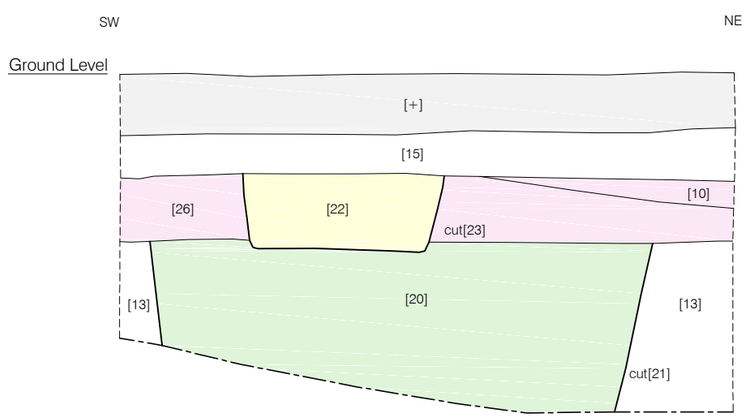
18/04/17 CF

Figure 3
Trench Plan
1:100 at A3

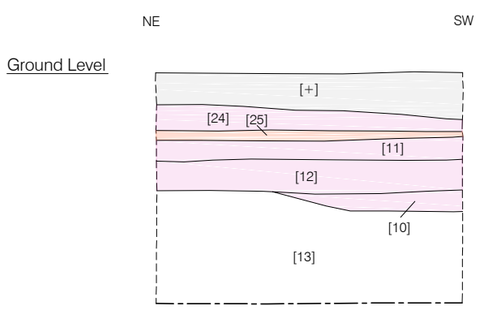


18/04/17 CF

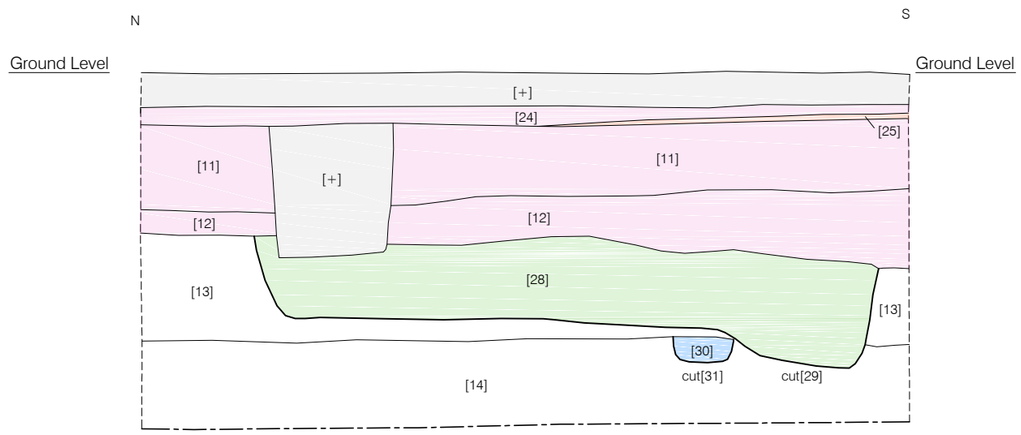
Figure 4
Plan of Service Trench
1:20 at A4



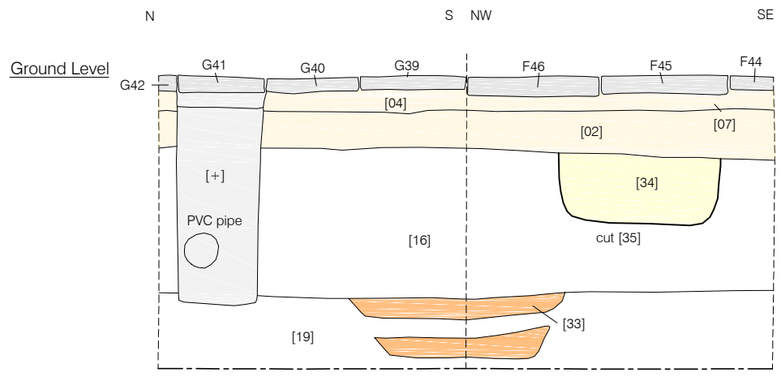
Section 5
South East Facing
Outer Ring



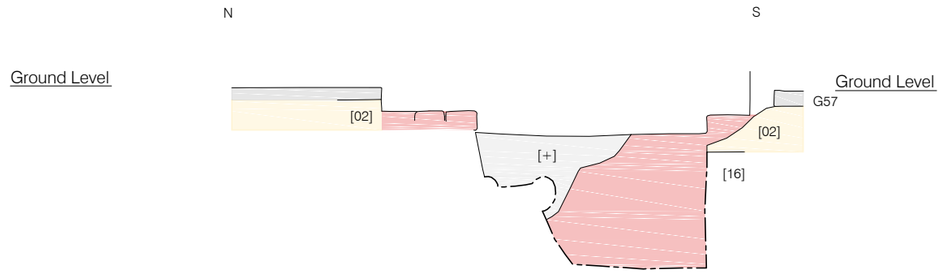
Section 6
North West Facing
Outer Ring



Section 8
West Facing
Outer Ring



Section 12
West and South West Facing
Inner Ring



Section 14
West Facing
Service Trench

- Construction Material
- Garden Features
- Fill of Cut for Lightning Conductor
- Levelling Layer or Made Ground
- Probable Land Drain
- Former Surface Associated with Pagoda
- Brick Masonry
- Bedding/ Make-Up Layer for slabs
- Concrete Slab
- Modern Material/ Truncation

0 1m

18/04/17 CF

Figure 5
Sections 5, 6, 8, 12 and 14
1:20 at A3

8 DISCUSSION AND CONCLUSIONS

8.1 The watching brief monitored excavation works at The Great Pagoda for the installation of scaffolding to allow renovation works to commence. This supplements a number of earlier phases of work (see Haslam, 2016).

8.2 The excavation comprised two concentric octagonal ring trenches (Outer 21.60m diameter, Inner 12.20m diameter) and a Service Trench (1.58m N-S by 0.82m E-W).

8.3 Natural gravely sand was recorded in both the Inner and Outer Rings (Phase 1).

8.4 Archaeological horizons and features dating to the 18th century were encountered within both Inner and Outer Ring excavations (Phase 2). These related to activity prior to or contemporary to the initial construction of the Pagoda. Within the Inner Ring these comprised layers of made ground associated with the erecting of the Pagoda. Cutting natural horizons within The Outer Ring were two silted up land drains overlain by a layer of subsoil, which was in turn cut by two backfilled garden features. These archaeological deposits predate the erection of the Pagoda. A series of layers overlay the previous garden features, and were deposited during the construction of the Pagoda.

8.5 Archaeological Phase 3 features and horizons related to post construction activities and remodelling works associated with the Pagoda. Within the Inner Ring, levelling horizons were overlain by deposits of quick lime and mortar. The 1800 to 1900 date range for these would suggest these relate to a later phase of modification/improvement as opposed to original construction. Also, dated to this period were a series of post-construction levelling horizons, a trench for the installation of a lightening conductor and a series of cuts which served an uncertain purpose. Former topsoil horizons and remnants of pathways dated to this phase testify to earlier ground conditions and levels. The assemblages of building material recovered (particularly the variety of roof tiles) further testify to multiple phases of re-modelling during this period.

8.6 Subsequent 20th century modifications (Phase 4) to the former pathways were represented by the overlying tarmac and resin bonded gravel surface.

8.7 The results of the watching brief will be published as a summary by PCA in the annual 'Round-Up' of London Archaeologist.

8.8 The site archive will be deposited with the Historic Royal Palaces archive at Hampton Court under Site Code KEW 06 as issued by Historic Royal Palaces.

9 ACKNOWLEDGEMENTS

9.1 Pre-Construct Archaeology Ltd. would like to thank Historic Royal Palaces for commissioning the work. We also thank Patricia Les (Head of Building Conservation – HRP) and Rob Umney (Conservation Building Surveyor – HRP) for monitoring the project.

9.2 The supervisor would like to thank Jarrod Belle of Blue Sky Building and Shane and labourers of Madigan Gill for all their help and assistance on site. Also thanks to Richard Krason of Pre-Construct Archaeology for his work on site in my absence, and to Wayne Richards and John Joyce also of Pre-Construct Archaeology for finds collection.

The author wishes to thank Tim Bradley for project management and editing this report, and Charlotte Faiers for preparing the illustrations, Kevin Rielly for his assessment of animal bone, Amparo Valcarcel for her review of ceramic building materials, Chris Jarrett for his spot dating index of clay tobacco pipe, glass and pottery assessment.

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APPENDIX 1: PLATES

Plate 1: Inner Ring side D, looking southeast, contexts [4], [2], [16], [19] and [14], 1m scale

Plate 2: Outer Ring side B, looking southwest, contexts [11], [12], [13] and [14], 1m scale

Plate 3: Outer Ring side G, looking east, land rain [30] [31] in section, 1m scale

Plate 4: Outer Ring side H, looking northwest, garden feature [20] [21] cut by lightening conductor trench [22] [23], 1m scale

Plate 5: Outer Ring side G, looking east, layers [11], [12], [13] and [14] with garden feature [28] [29] and land drain [30] [31], 1m scale

Plate 6: Outer Ring sides A and B, looking north, layers [15], [10] and [13], 1m scale

Plate 7: Inner Ring side C, looking west, layers [2], [16], [19], [36] and [14] with quicklime deposit [27], 1m scale

Plate 8: Inner Ring side A, looking west, quicklime deposit [18], 1m scale

Plate 9: Inner Ring side E, looking north, layers [4], [2], [16] and [19]
With quicklime deposit [32], 1m scale

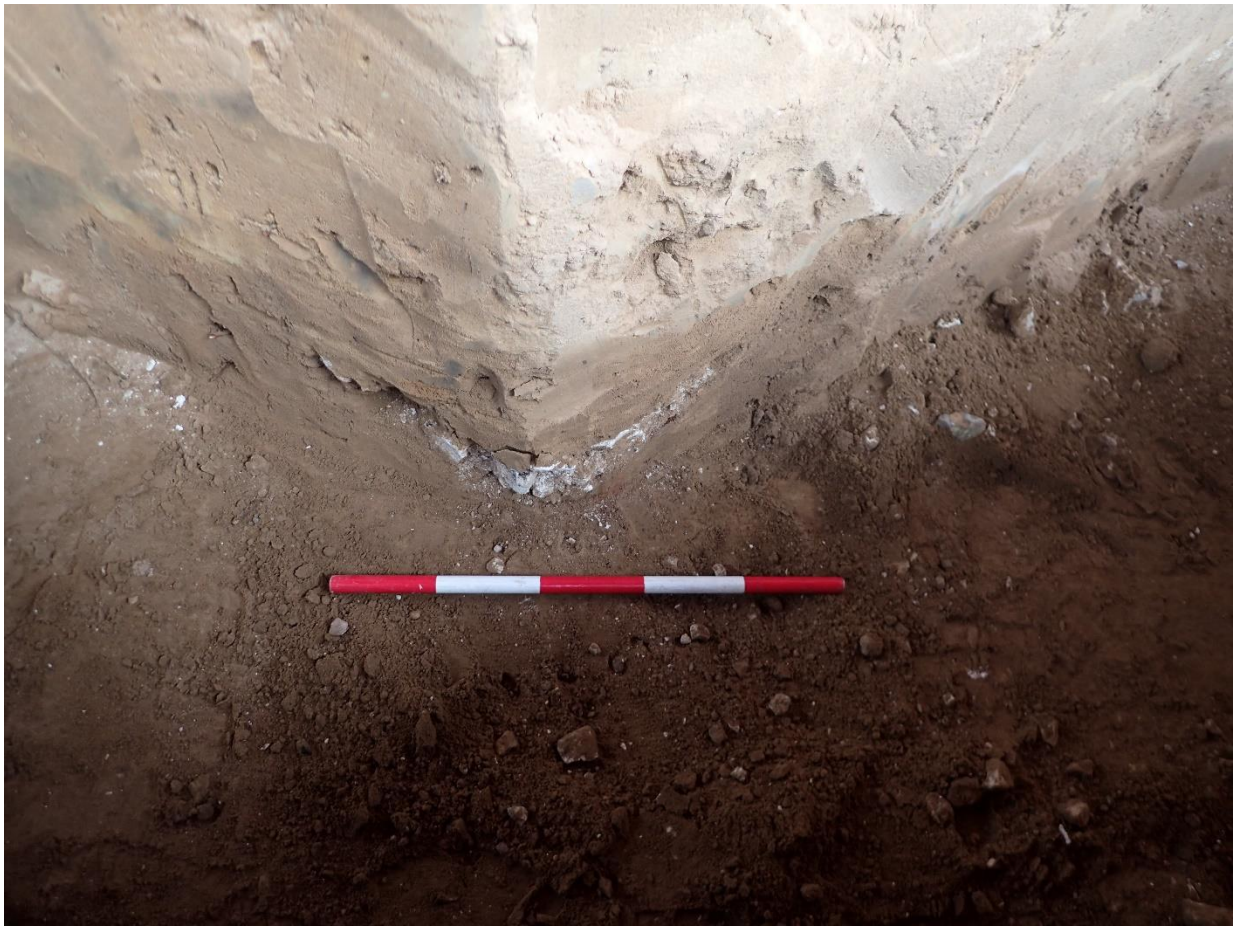


Plate 10: Inner Ring sides E and F, looking north-northeast, layers [16] and [19] with quicklime deposit [39], 1m scale

Plate 11: Service Trench side G, looking east, modern truncation through foundation wall of The Great Pagoda, 1m scale

Plate 12: Inner Ring side F, looking northeast, layers [7], [2], [16] and [19] with lightening conductor trench [34] [35] and quicklime deposit [33], 1m scale

Plate 13: Inner Ring side H, looking northwest, layers [2], [16] and [19], 1m scale

Plate 14: Inner Ring side C, looking east, [37] fill of [38] cutting through layers [2], [16], [19], [36] and [14], 1m scale

Plate 15: Inner Ring side B, looking east, decayed wood lining of cut [38], 1m scale

Plate 16: underside of flagstone G30, 1m scale

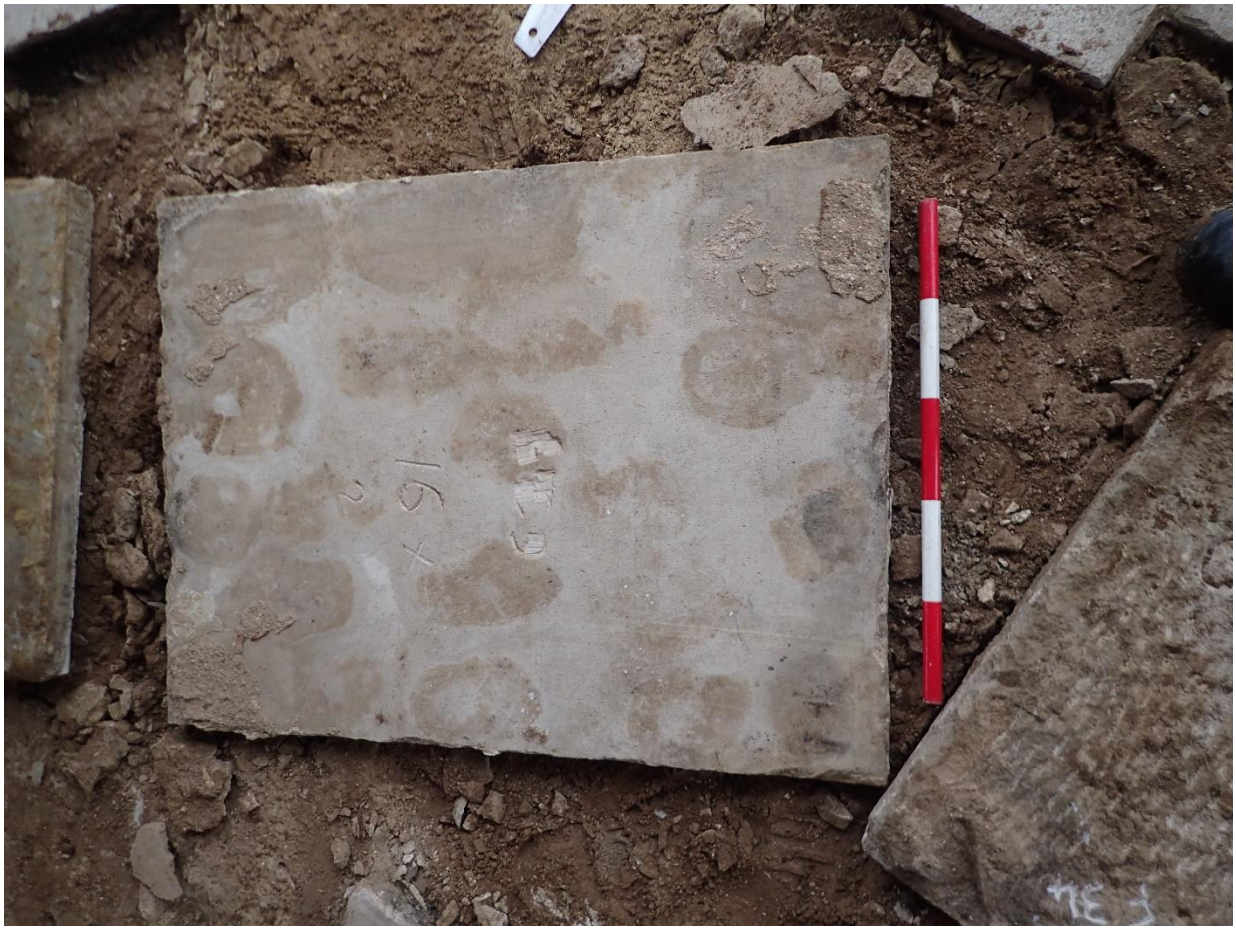


Plate 17: underside of flagstone F33, 1m scale

Plate 18: underside of flagstone F20, 1m scale

Plate 19: underside of flagstone E35, 1m scale

Plate 20: underside of flagstone E33, 1m scale

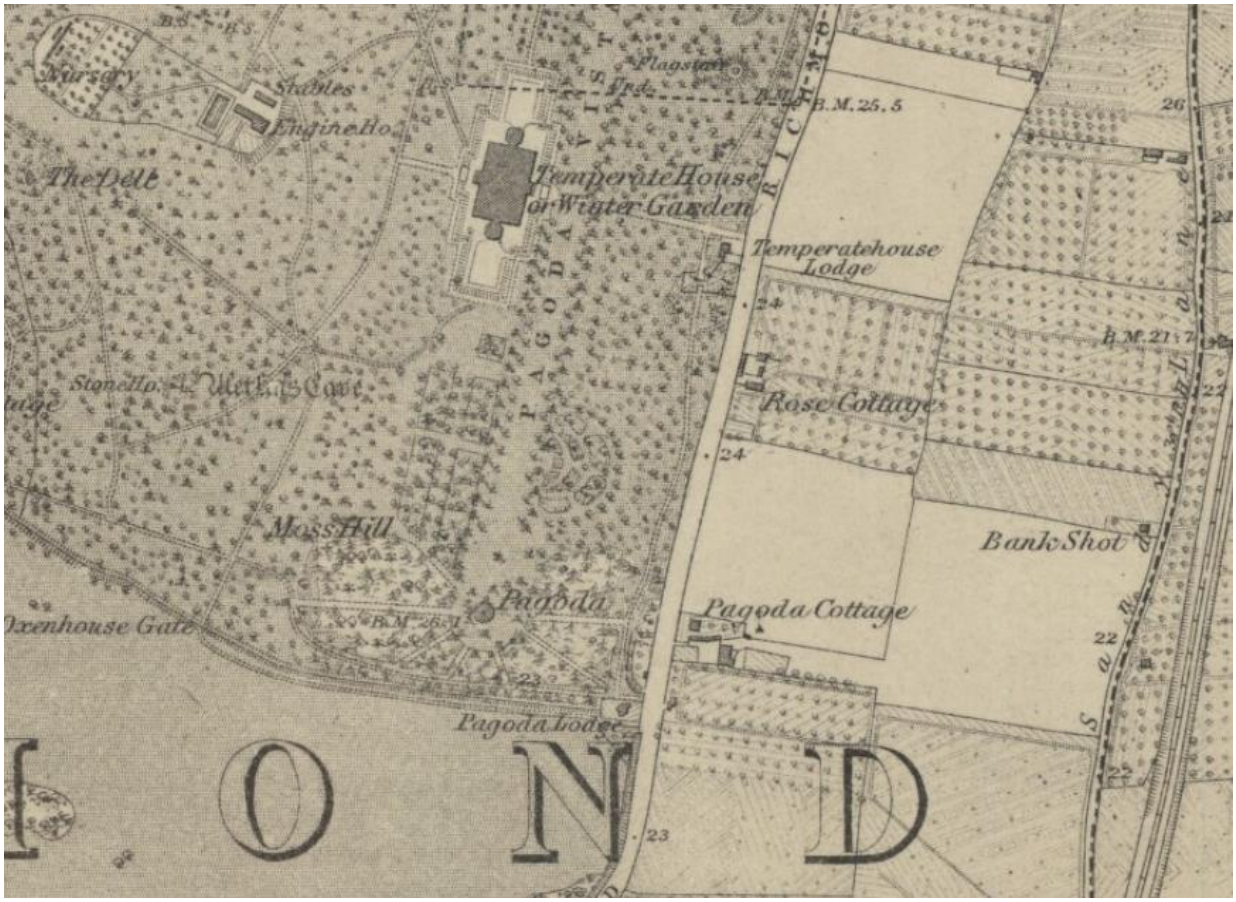
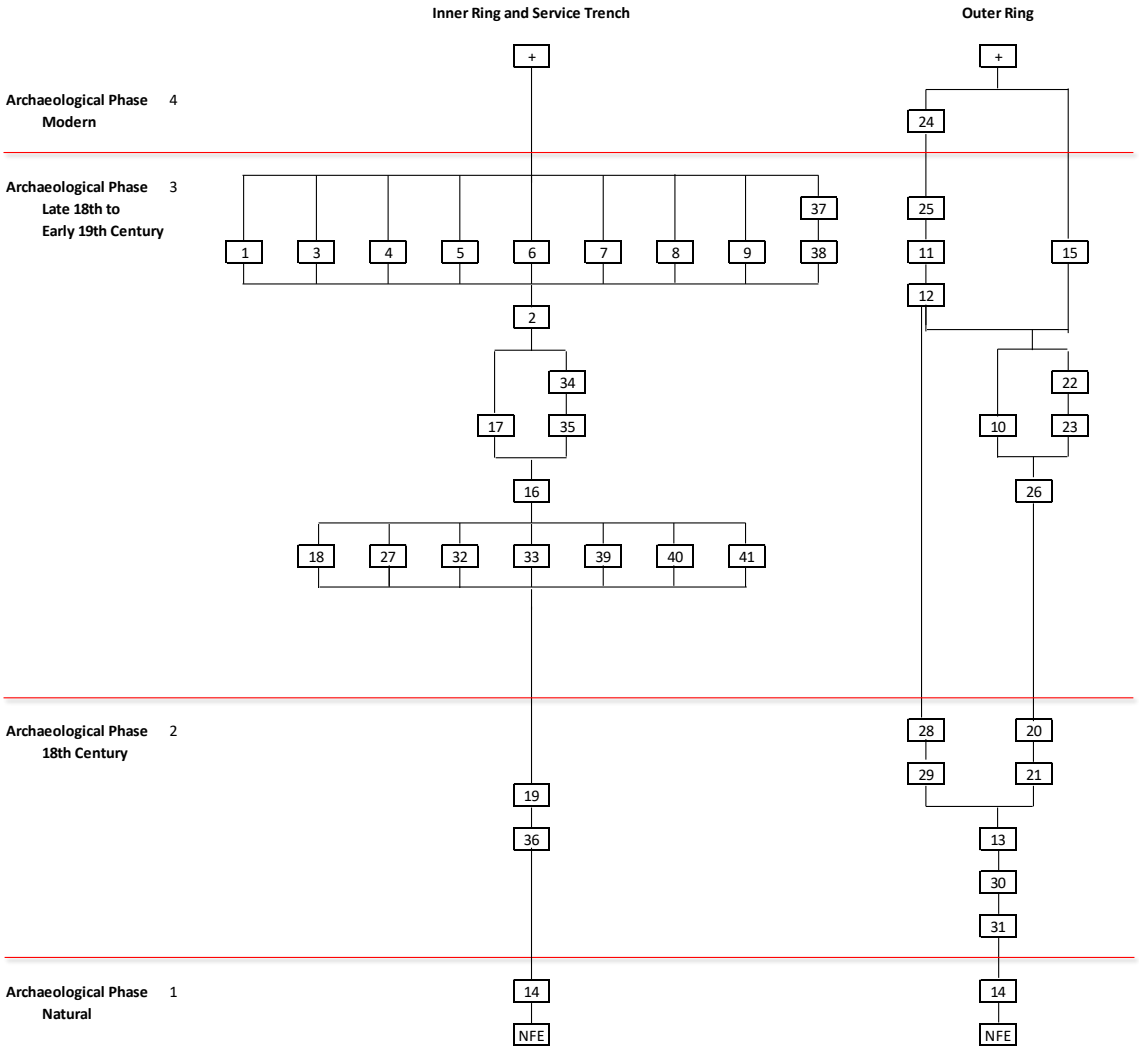


Plate 21: Southeast corner of Kew Gardens OS map 1871 http://maps.nls.uk/view/102347409

APPENDIX 2: CONTEXT INDEX

Context	Trench	Section_no	Plan_no	CTX_Type	Phase	CTX_Interpretation
1	Inner Ring			Layer	KEW06-PH3	Cement bedding layer for flagstones
2	Inner Ring	3, 10, 12, 9, 4, 13, 7		Layer	KEW06-PH3	Sand bedding layer for flagstones
3	Inner Ring	3		Layer	KEW06-PH3	Bedding layer below regedded flagstones
4	Inner Ring	13, 9, 10, 12		Layer	KEW06-PH3	Bedding layer below flagstones
5	Inner Ring			Layer	KEW06-PH3	Bedding layer for rebedded flagstones G36, G45 and G25
6	Inner Ring			Layer	KEW06-PH3	Bedding layer for flagstones G32, G41
7	Inner Ring			Layer	KEW06-PH3	Bedding layer for rebedded flagstones G15, F46, F45 and F25
8	Inner Ring			Layer	KEW06-PH3	Resin mixed with stone dust/sand for rebedding flagstone D31
9	Inner Ring			Layer	KEW06-PH3	Cement bedding layer for flagstones D14 and D22
10	Outer Ring	5, 2, 6	10	Layer	KEW06-PH3	Demolition rubble leveling layer
11	Outer Ring	6, 1	11	Layer	KEW06-PH3	Layer of made ground
12	Outer Ring	1, 6, 8	12	Layer	KEW06-PH3	Layer of made ground/leveling
13	Outer Ring	8, 5, 6, 11, 2, 1	13	Layer	KEW06-PH2	Layer of buried subsoil
14	Outer and Inner Ring	1, 8, 9, 11, 7	14	Natural	KEW06-PH1	Mid yellow orange gravely sand
15	Outer Ring	11, 2, 5	15	Layer	KEW06-PH3	Layer of buried top soil
16	Inner Ring	3, 12, 10, 9, 7, 4, 13	16	Layer	KEW06-PH3	Layer of redeposited sand
17	Inner Ring		17	Masonry	KEW06-PH3	Remnant of stone, suggesting earlier working surface/ground level
18	Inner Ring	3	18	Layer	KEW06-PH3	Dump of construction material
19	Inner Ring	3, 12, 13, 10, 4, 9, 7	19	Layer	KEW06-PH3	Redeposited sand made ground
20	Outer Ring	5		Fill	KEW06-PH2	Fill of garden feature
21	Outer Ring	5	21	Cut	KEW06-PH2	Cut of garden feature
22	Outer Ring	5		Fill	KEW06-PH3	Fill of cut containing lightening conductor
23	Outer Ring	5	23	Cut	KEW06-PH3	Linear cut containing lightening conductor
24	Outer Ring	8, 6	24	Layer	KEW06-PH4	Leveling around Pagoda
25	Outer Ring	8, 6	25	Layer	KEW06-PH3	Old surface around Pagoda, also seen in eval slot (side H)
26	Outer Ring	5	26	Layer	KEW06-PH3	Layer of made ground, most likely leveling
27	Inner Ring	7	18	Layer	KEW06-PH3	Dump of construction material
28	Outer Ring	8		Fill	KEW06-PH2	Fill of possible garden feature
29	Outer Ring	8	29	Cut	KEW06-PH2	Fill of possible garden feature
30	Outer Ring	8		Fill	KEW06-PH2	Silting up of linear
31	Outer Ring	8	31	Cut	KEW06-PH2	two paralel linears, land drains?
32	Inner Ring	10	18	Layer	KEW06-PH3	Dump of construction material
33	Inner Ring	12	18	Layer	KEW06-PH3	Dump of construction material
34	Inner Ring	12		Fill	KEW06-PH3	Fill of lightening conductor cut
35	Inner Ring	12	35	Cut	KEW06-PH3	Cut of lightening conductor
36	Inner Ring	7	36	Layer	KEW06-PH3	Leveling layer to east of Pagoda
37	Inner Ring	13		Fill	KEW06-PH3	Rubbly sand fill of cut [38]
38	Inner Ring	13		Cut	KEW06-PH3	Cuts possibly relating to the construction of the Pagoda.
39	Inner Ring		18	Layer	KEW06-PH3	Dump of construction material
40	Inner Ring		18	Layer	KEW06-PH3	Dump of construction material
41	Inner Ring		18	Layer	KEW06-PH3	Dump of construction material

APPENDIX 3: STRATIGRAPHIC MATRIX



APPENDIX 4: OASIS DATA COLLECTION FORM

OASIS ID: preconst1-280850

Project details

Project name	The Great Pagoda Phase 1V
Short description of the project	Pre-Construct Archaeology conducted an archaeological watching brief on the ground works associated with the installation of scaffolding required for renovation works to commence at The Great Pagoda at Royal Botanic Gardens, Kew TW9 3AB. between the 6th February and 6th March 2017. The excavations consisted of two concentric octagonal installation trenches for concrete ring beams, and a small trench against the outside of the west facing Pagoda door for access to services.
Project dates	Start: 06-02-2017 End: 06-03-2017
Previous/future work	Yes / Not known
Any associated project reference codes	KEWP14 - Sitecode
Any associated project reference codes	KEW05 - Sitecode
Type of project	Recording project
Site status	World Heritage Site
Current Land use	Other 5 - Garden
Monument type	PAGODA Post Medieval
Significant Finds	WORKED MARBLE Post Medieval
Significant Finds	POTTERY Post Medieval
Significant Finds	GLASS Post Medieval
Significant Finds	CBM Post Medieval
Significant Finds	CTP Post Medieval
Significant Finds	ANIMAL BONE Post Medieval
Investigation type	"Watching Brief"
Prompt	Conservation/ restoration

Project location

Country	England
Site location	GREATER LONDON RICHMOND UPON THAMES RICHMOND AND KEW The Great Pagoda

Postcode	TW9 3AB
Study area	500 Square metres
Site coordinates	TQ 18471 76076 51.470733847363 -0.294109884531 51 28 14 N 000 17 38 W Point
Height OD / Depth	Min: 0m Max: 0m

Project creators

Name of Organisation	Pre-Construct Archaeology Limited
Project brief originator	Historic Royal Palaces
Project design originator	Tim Bradley
Project director/manager	Tim Bradley
Project supervisor	Stacey Amanda Harris
Type of sponsor/funding body	Royal Botanic Gardens / Historic Royal Palaces

Project archives

Physical Archive recipient	Historic Royal Palaces
Physical Archive ID	KEW06
Physical Contents	"Animal Bones","Ceramics","Glass","Worked stone/lithics"
Digital Archive recipient	Historic Royal Palaces
Digital Archive ID	KEW06
Digital Media available	"Images raster / digital photography","Text"
Paper Archive recipient	Historic Royal Palaces
Paper Archive ID	KEW06
Paper Media available	"Context sheet","Drawing","Plan","Report","Section"

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	The Great Pagoda, Royal Botanic Gardens, Kew, London Borough of Richmond-Upon-Thames TW9 3AB: An Archaeological Watching Brief

Author(s)/Editor(s)	Harris, S. A.
Date	2017
Issuer or publisher	Pre-Construct Archaeology Limited
Place of issue or publication	London
Entered by	Archive (archive@pre-construct.com)
Entered on	29 March 2017

APPENDIX 5: CERAMIC AND STONE BUILDING MATERIAL ASSESSMENT

Ceramic and Stone Building Material (Kew 06 Phase IV)

Amparo Valcarcel

Building Materials Spot Dates

Context	Fabric	Form	Size	Date range of material		Latest dated material		Spot date	Spot date with mortar
Under A12	3115	Slate slab, possible for levelling	1	300	1950	300	1950	1760-1900	No mortar
2	2271;3110;3115	Medieval/post medieval peg tiles; Portland pavers; slate roofing (hole)	18	300	1950	300	1950	1800-1900	No mortar
4	2276;3115	Slate roofing; post medieval peg tile	2	300	1950	300	1950	1760-1900	No mortar
7	2850	Flemish post medieval floor tile	1	1450	1800	1450	1800	1700-1800	No mortar
12	3114	Decorative piece of white marble	1	70	1900	70	1900	1800-1900	No mortar
13	2276	Post medieval unglazed peg tile	1	1480	1900	1480	1900	1480-1900	No mortar
15	3110;3115;3113;3120	Portland pavers; slate roofing; coal fragments; Kimmerigde oil shale	11	300	1950	300	1950	1800-1900	1750-1900
16	2271;2276;2279;3115	Medieval/post medieval peg and pan tiles; slate roofing	6	300	1950	300	1950	1760-1900	1750-1900
17	3110	Portland pavers	2	1666	1900	1666	1900	1800-1900	No mortar
19	3116	Burnt chalk rubble	1	50	1800	50	1800	1700-1900	No mortar
20	2271;2276;3032	Post medieval peg tiles; post great fire bricks	8	1180	1900	1666	1900	1666-1900	No mortar
26	3115	Slate roofing	1	300	1950	300	1950	1760-1900	No mortar
33	2276;3032; 3101PM	Post medieval peg tiles; post great fire brick; Roman mortar	4	1480	1900	1666	1900	1666-1900	1800-1950
34	3115	Slate roofing	1	300	1950	300	1950	1760-1900	No mortar

Context	Fabric	Form	Size	Date range of material		Latest dated material		Spot date	Spot date with mortar
37	3115	Slate roofing	1	300	1950	300	1950	1760-1900	No mortar

Review

The assemblage (61 fragments, 10.30 kg) consists mainly of small pieces of fragmentary late post medieval ceramic building material. To note that almost all the material (73%) is roofing, with some examples of bricks and pavers.

Overlapping, flat rectangular peg tiles attached to roofing by two nails (as represented by two nail holes) form numerically the most common medieval and post medieval roofing form. Two different fabrics were recorded, the thin-reduced core 2271 and the very common sandy red fabric 2276. The introduction of pan tiles is also noted by the presence of fabric 2279.

One example of unglazed Flemish silty floor tile was recovered from [7]. Only two bricks examples were collected from [20] [33], and are made by post great fire fabric 3032. The presence of these bricks shows a phase of development at the end of 18th and late 19th century.

A group of thin laminated dark green –grey (Horsham slate) had been identified in different contexts. They may have once been used as roofing stone for the Pagoda or indeed as possible coursing levels in walls core. In the absence of any definable nail holes (just in two examples from [2] and [15]) it is not possible to determine their function.

Chalk rubble probably was used in the foundations and in the walls, is a material easily available in southern Britain. Portland stone was using as modern paving slab [2] [15] [17]. A coal fragment and Kimmerigde oil shale possible used as fuel, was recovered from [15].

The marble piece from [12] appear to be a Victorian architectural or furniture element (such as a cornice) rather than from sculpture.

The different roofing tiles fabrics (2279, 2271, 2276 and 3115) and forms (pan and peg tiles) suggests the existence of different Pagoda roof coverings phases.

Recommendations

The quantity of roofing recovered from KEW 06 possible reflects different phases associated to covering and remodelling the Pagoda building. The decorative marble piece is the only interesting piece. The building material assemblage reflects the later post medieval development of this site. No further work recommended.

APPENDIX 6: POTTERY ASSESSMENT

Pottery Assessment (KEW06)

Chris Jarrett

Introduction

A small assemblage of pottery was recovered from the archaeological work and consists of fifteen sherds/15 estimated number of vessels (ENV)/164g, of which none was unstratified. The pottery dates solely to the post-medieval period. The assemblage is in a largely good condition and found only as sherd material that appears to have been deposited under mainly tertiary deposition conditions. The material was found in seven contexts and as only small sized groups (fewer than 30 sherds). The classification of the pottery types is according to the Museum of London Archaeology (2014). The assemblage is discussed as an index.

Index

Context [2], spot date: 18th century

Chinese porcelain (CHPO), 1580–1900, 1 sherd, 1 ENV, 4g, form: unidentified. Body sherd, pale grey glaze. A partial mortar deposit

London-area post-medieval redware (PMR), 1580–1900, 1 sherd, 1 ENV, 8g, form: unidentified. Body sherd

Surrey-Hampshire border redware (RBOR), 1550–1900, 1 sherd, 1 ENV, 26g, form: tripod pipkin. Base and foot, reduced internal glaze. ?variant Surrey-Hampshire border ware-type product

Surrey-Hampshire border redware (RBOR), 1580–1900, 1 sherd, 1 ENV, 13g, form: unidentified. Base

Surrey-Hampshire border redware (RBOR), 1580–1900, 1 sherd, 1 ENV, 9g, form: unidentified. Base, the glaze has chipped off in places

Staffordshire-type mottled brown-glazed ware (STMO), 1650-1800, 1 sherd, 1 ENV, 3g, form: unidentified. Body sherd

English tin-glazed ware (TGW), 1570–1846, 1 sherd, 1 ENV, 12g, form: rounded bowl. Body sherd, external blue lines above and below a blue band

English tin-glazed ware (TGW), 1570–1846, 1 sherd, 1 ENV, 2g, form: jar. Shoulder. The glaze is missing

Context [12], spot date: 1740–1830

Creamware (CREA), 1740–1830, 1 sherd, 1 ENV, 3g, form: small rounded jar. Rim sherd, upright. Short. Simple, internal lid-seated/gallery

London-area post-medieval redware (PMR), 1580–1900, 1 sherd, 1 ENV, 38g, form: flower pot. Rim sherd, rolled oval section

Context [13], spot date: 1580–1900

London-area post-medieval redware (PMR), 1580–1900, GLE 1 sherd, 1 ENV, 2g, form: unidentified. Body sherd

Context [16], spot date: 1580–1900

London-area post-medieval redware (PMR), 1580–1900, GLE 1 sherd, 1 ENV, 16g, form: unidentified. Body sherd, external corrugated band, internal and external glaze

Context [19], spot date: 1550–1700

Frechen stoneware (FREC), 1550–1700, 1 sherd, 1 ENV, 12g, form: rounded jug. Body sherd

Context [20], spot date: 1580–1900

London-area post-medieval redware (PMR), 1580–1900, 1 sherd, 1 ENV, 7g, form: unidentified. Body sherd, internal and external glaze, partially covered in mortar

Context [26], spot date: 1550–1700

Surrey-Hampshire border whiteware with green glaze (BORDG), 1550–1700 1 sherd, 1 ENV, 9g, form: porringer. Rim sherd, rounded thickened rim, external incised line and an internal glaze

Significance, potential and recommendations for further work

The pottery has very little significance at a regional level as the material is fragmentary and cannot be readily assigned to a form. It is possible that the coarse wares (*e.g*. the Surrey-Hampshire border wares and the London area post-medieval redware) were derived from the kitchens of Kew Palace or its forerunner, while the Chinese porcelain and the tin-glazed ware may have been used in more formal areas of the buildings and the flower pot was obviously associated with horticultural activities on the study area. The main potential of the pottery is to date the contexts it was recovered from. There are no recommendations for further work on the pottery.

Reference

Museum of London Archaeology, 2014. Medieval and post-medieval pottery codes. http://www.mola.org.uk/resources/medieval-and-post-medieval-pottery-codes

APPENDIX 7: CLAY TOBACCO PIPE ASSESSMENT

Clay tobacco pipe spot dating index (KEW06)

Chris Jarrett

Introduction

A small sized assemblage of clay tobacco pipes was recovered from the site. All of the fragments are fragmentary and are likely to have been deposited under tertiary conditions. Clay tobacco pipes occur in four contexts as small (under 30 fragments) sized groups and are found as 36 fragments, represented by four bowls, one mouth part and 31 stems. The bowl types have been classified according to Atkinson and Oswald (1969) and prefixed AO, while the 18th-century bowl types are according to Oswald's (1975) general typology and prefixed OS. The material is discussed as an index and contexts containing only stems or nibs have been broadly dated according to the thickness of the stem and diameter size of the bore.

Spot dating catalogue

Context [2], spot date: 1700-1740

x1 OS10 Bowl, 1710–1740. Survives mostly as a heel initialled P W and a medium thickness stem with a thin bore. The item shows evidence of burning.

x1 OS10 Bowl, 1710–1740. Survives mostly as a heel with crown marks on each side and a medium thickness stem with a thin bore. The item shows evidence of burning.

x1 bowl 18th-century bowl fragment

x1 mouthpart with cut end and a thin diameter and a wide bore,

X14 stem fragments: x6 thick diameters: x3 medium bores, x3 thin bores, x 8 thin diameters: x7, medium bores, x1thin bore

X2 stem fragments and both have red stained surfaces: x1 medium diameter and wide bores, x1 thin diameter and a fine bore

Context [16], spot date: 1680–1710

x1 AO21 heeled angled bowl with a rounded front and a straight back, 1680–1710. The back of the bowl is missing and the item is in two fragments. The bowl surfaces are nicely wiped and there is no milling of the rim

x 9 stems: x6 thick diameters and medium bores, x3 medium thickness and medium to thin bores, x1 medium thickness and a wide bore, x1 thin thickness and a wide bore

Context [19], spot date: ?18th century

x4 stems: x1 medium thickness and medium bore, x2 medium thickness and a thin bore, x2 thin thickness and medium thin bores

Context [20], spot date: ?17th-18th century

X2 stems: x1 medium thickness and the bore size was not observed x1 thin thickness and medium sized bore. Both items were covered in mortar

Significance, potential and recommendations for further work

The assemblage has little significance as the material occurs as small groups without much meaning and in a fragmentary state. The only potential of the clay tobacco pipes is to broadly date the contexts it was recovered from. There are no recommendations for further work on the assemblage.

References

Atkinson, D. and Oswald, A. 1969. 'London clay tobacco pipes', Journal of British Archaeology Association, 3rd series, Vol. 32, 171-227.

Oswald, A. 1975. *Clay pipes for the Archaeologist*, British Archaeological Reports, British series, No.14.

APPENDIX 8: GLASS ASSESSMENT

Glass spot dating index (KEW06)

Chris Jarrett

Introduction

The glass recovered from the archaeological investigation consists of three fragments, representing 4 estimated number of vessels (ENV) and weighing 21g. The glass dates solely to the Romano post-medieval period. The condition of the material is good, although fragmentary and the material appears to have been subjected to tertiary depositional processes. The glass was recovered from three contexts.

Spot dating index

Context [12], spot date: post-medieval

Clear high-lime low alkali glass: 1 fragment, 1 ENV, 1g, form: window pane. Post-medieval.

Context [20], spot date: ? mid 18th century

Pale olive green soda glass, 1 fragment, 1 ENV, 1g, form: English wine bottle. Cylindrical wall fragment possibly derived from a mid 18th-century mallet-type wine bottle. Naturally weathered.

Context [37], spot date: mid 17th century

Pale olive green soda glass, 1 fragment, 1 ENV, 4g, form: English wine bottle. Rim sherd: everted with a narrow rounded cordon immediately below the rim and dated to the mid 17th century. Probably derived from a globe and shaft wine bottle. Naturally weathered.

Significance, potential and recommendations for further work

The glass has no significance at a local level as it consists of fragmentary material. The main potential of the glass is to broadly date the contexts it was recovered from. There are no recommendations for further work on the glass assemblage.

APPENDIX 9: ANIMAL BONE ASSESSMENT

Assessment of animal bone recovered from A Watching Brief at Kew Pagoda Phase IV, Kew Royal Botanic Gardens, London Borough of Richmond (KEW06)

Kevin Rielly, March 2017

Introduction

Renovation work at the Great Pagoda comprised the excavation of two concentric trenches (an inner and an outer) around the base of the structure as well as a service trench adjacent to the entrance on the west side of the Pagoda. The inner ring and the service trench revealed evidence for the construction of the Pagoda (built between 1761-2) comprising a series of levelling deposits, while the outer ring provided deposits associated with the landscaping of the surrounding garden as well as the remains of various garden features. This evidence has been placed within a sequence of 4 phases (incorporating the historical data) developing from Phase 1 - Natural, Phase 2 – the 18th century domestic use of this area and the establishment of the pleasure gardens by Frederick, Prince of Wales, after 1731, Phase 3 – Late 18th to early 19th century with the construction of the Pagoda up to the establishment of the Royal Botanic Gardens in 1840, and Phase 4 – Modern.

A small amount of animal bones were recovered, all by hand, from the Inner and Outer rings, the majority from the former and generally dated to Phase 3. The assemblage was generally well preserved showing a moderate level of fragmentation.

Methodology

The bone was recorded to species/taxonomic category where possible and to size class in the case of unidentifiable bones such as ribs, fragments of longbone shaft and the majority of vertebra fragments. Recording follows the established techniques whereby details of the element, species, bone portion, state of fusion, wear of the dentition, anatomical measurements and taphonomic including natural and anthropogenic modifications to the bone were registered.

Description of faunal assemblage

The site provided a hand recovered total of 7 animal bones, taken from 5 deposits, as shown in Table 1. The earlier deposit [20] from Phase 2 is the fill/contents of the Outer Ring garden feature [21], while the Inner Ring deposits, all dated to Phase 3, represent various sealing/levelling deposits. Amongst the identifiable remains, there is part of a naturally polled (hornless) sheep skull from [20] and then a cattle second phalange from [16] and a sheep/goat scapula from [2]. The cattle- and sheep-size bones are all rib and vertebral fragments, one of the latter (a cattle-size cervical vertebra) showing a typical ‘split’ butchery demonstrating the halving of the carcass. With the inclusion of head and foot parts as well as the main ‘meat-bearing’ parts of the skeleton, it can be proposed that these collections incorporate

processing as well as food waste. There is just the one ageable bone, the polled sheep skull, which clearly derives from an adult individual, while none of the bones could be measured. However, none appear to be within the large size range signifying the presence of 'improved' stock, these generally entering the London meat markets from the beginning of the 19th century (based on Rixson 2000, 215 and the evidence from post-medieval London animal bone assemblages as for example found at Thameslink – Rielly in prep).

Phase:	**2**	**3**				**3**
Location:	**OR**	**IR**				**All**
Context:	**20**	**2**	**16**	**27**	**32**	
Species						
Cattle			1			1
Cattle-size	1					
Sheep/Goat		1				1
Sheep	1					
Sheep-size	1			1	1	2
Grand Total	**3**	**1**	**1**	**1**	**1**	**4**

Table 1. Hand collected species abundance by phase, location and context where OR is Outer Ring and IR is Inner Ring.

Conclusions and recommendations for further work

These few animal bones clearly suggest the use of particular food species (cattle and sheep/goat) in this locality during the major periods of occupation. There is insufficient evidence to suggest the general age of the animals consumed or indeed the size/type of the cattle and sheep exploited for such purposes. However, as stated, there is a notable absence of 'improved' types, noting perhaps the continued use of local 'unimproved' varieties. Of interest in this respect is the presence of a polled sheep, this perhaps signifying one of the old South-East England hornless 'types' such as the Southdown or the occasionally polled Berkshire Nott (Hall and Clutton-Brock 1995, 180 and 191).

Considering the affluent nature of the local population in the 18th century, it might be surmised that the bones would show some evidence for 'good living'. No such evidence is forthcoming considering in part the rather small size of this collection and the apparent change amongst the well-to-do from approximately the 17th/18th century onwards away from the obvious high status comestibles as deer and swan, towards the less obviously affluent beef and mutton (after Wilson 1973, 96).

No further work can be suggested for these bones.

References

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