

NATIONAL MARITIME MUSEUM

SAMMY OFER WING

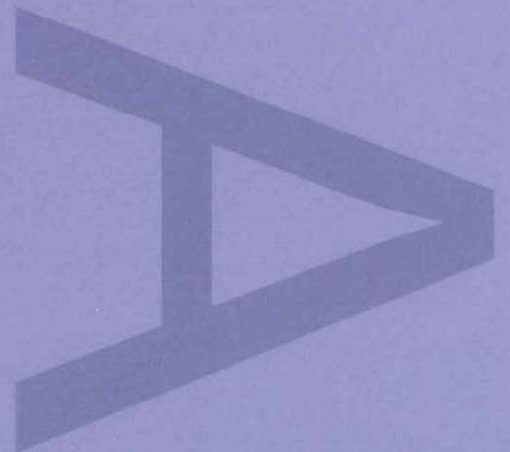
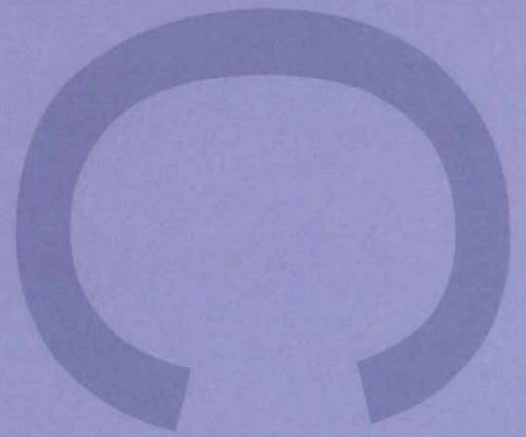
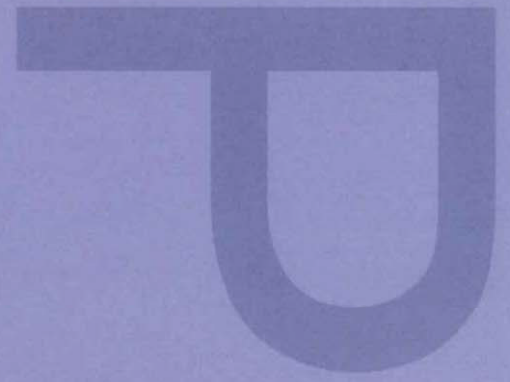
LONDON BOROUGH OF GREENWICH

ASSESSMENT OF AN

ARCHAEOLOGICAL INVESTIGATION

NMI 09

FEBRUARY 2011



PRE-CONSTRUCT ARCHAEOLOGY

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NATIONAL MARITIME MUSEUM
SAMMY OFER WING
LONDON SE4
LONDON BOROUGH OF GREENWICH

ARCHAEOLOGICAL INVESTIGATION

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**Archaeological Investigations at National Maritime Museum, Sammy
Ofer Wing, London SE4, London Borough of Greenwich**

Site Code: NMI 09

Central National Grid Reference: TQ 3858 7758

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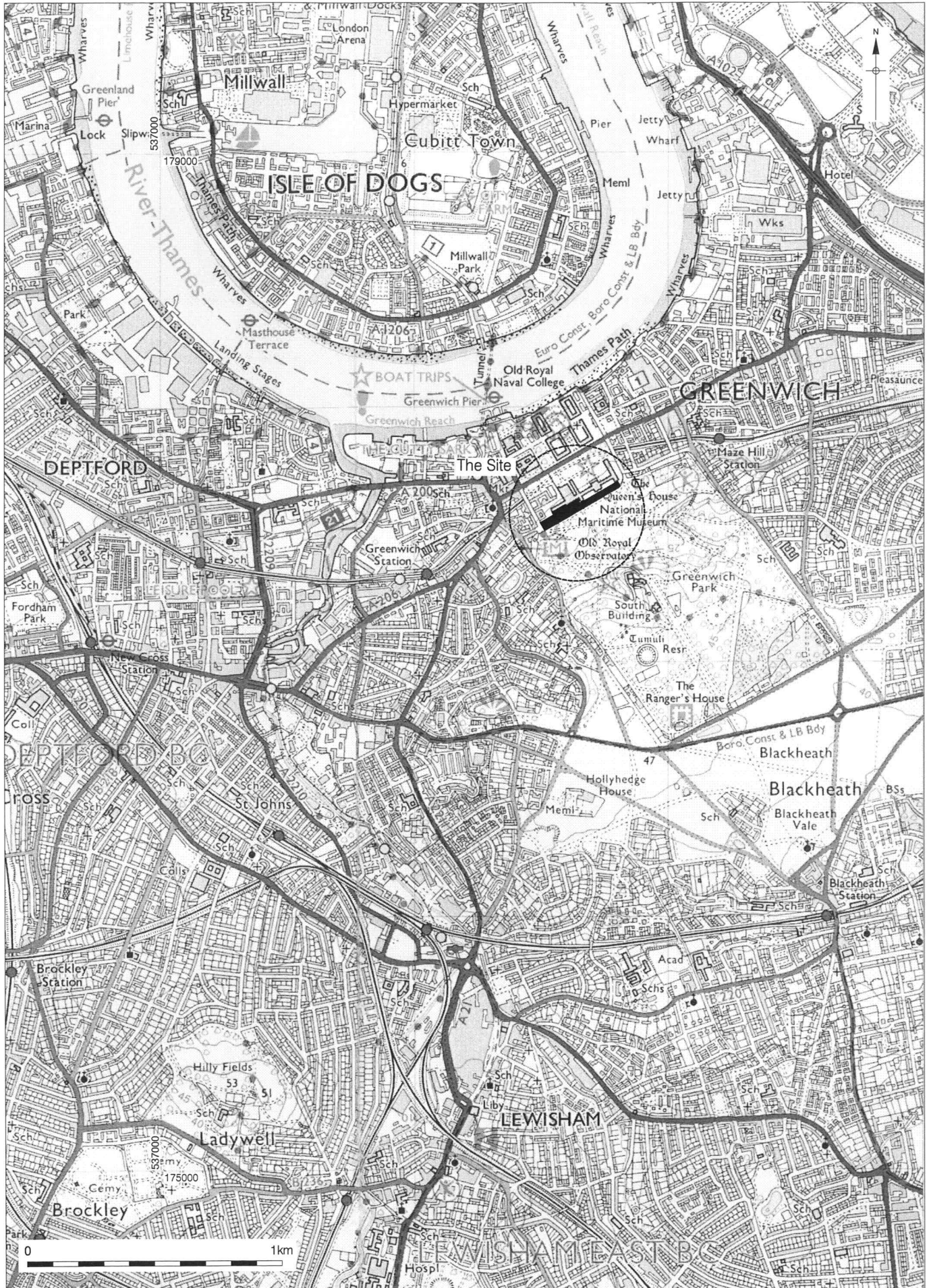
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1 ABSTRACT

- 1.1 This report details the results and working methods of an archaeological investigation undertaken by Pre-Construct Archaeology Ltd at The National Maritime Museum, London Borough of Greenwich (Fig. 1). The central National Grid Reference for this site is TQ 3858 7758. The main fieldwork was undertaken between November 2009 and January 2010, with additional watching briefs undertaken intermittently between August 2010 and February 2011. The commissioning client was the National Maritime Museum.
- 1.2 The earliest features on site consisted of two medieval pits and a boundary ditch which cut the natural sandy gravels. A section of the main Deptford – Woolwich highway, dating back to the 16th century was also observed running east-west to the north of the site.
- 1.3 The edge of road was truncated by burials associated with The Mariners Cemetery. In total 17 inhumations were recorded in 7 grave cuts, with each holding 2-3 bodies. Charnel from this cemetery was revealed in two 20th century pits and the backfill of a possible Victorian sewer pipe trench.
- 1.4 A brick built boundary wall and cellar dated to c.1800 were located in the north-east of the site. The wall separated Greenwich Park in the south from the Queen’s House to the north.
- 1.5 To the west of the site, in the present day King William Garden foundations and crypt walls of St Mary’s Church, (built in 1824), were recorded. Within the crypt of the church nine lead coffins were partially exposed during the excavation of a pipe trench. One was dated to 1852 by means of an inscription on its lid. This confirms documentary evidence that coffins were retained in the crypt of the church once the building was demolished in the 20th century.
- 1.6 In the central and eastern areas of the site a swimming pool, initially constructed in 1833 was observed. This had been constructed from ground level up and therefore only the lowermost sections were preserved.
- 1.7 Both the pool and St Mary’s Church were demolished in 1936, the demolition layers of which, along with the subsequent landscaping were recorded.

2 INTRODUCTION

- 2.1 An archaeological investigation was undertaken by Pre-Construct Archaeology Ltd at the National Maritime Museum, Sammy Ofer Wing, London Borough of Greenwich between November 2009 and January 2010 (Fig. 1). This took the form of an extended watching brief with small-scale open area excavations where required. Between August 2010 and February 2011 further small watching briefs occurred when two charnel pits and human bone within a sewer trench were uncovered. A pipe trench across the site of the crypt of St Mary's Church was also monitored. This was undertaken as part of the planning consent for the development of the site into a new wing for the National Maritime Museum. The work was commissioned by the National Maritime Museum.
- 2.2 The site was bounded by Greenwich Park to the south and University of Greenwich grounds to the north-east. The site lies within the 'Maritime Greenwich' World heritage Site and entirely within an Area of Archaeological Potential as defined by the London Borough of Greenwich. The Grade II statue of King William IV lies in the south-west of the site and a small stretch of the Grade I Registered Greenwich Park falls within the southern bounds of the site. A number of Statutory Listed Buildings lie in the immediate vicinity of the site, to its north and north-west, and the Queen's House, a Scheduled Monument, lies to the north-east.
- 2.3 The archaeological investigation was undertaken by Pre-Construct Archaeology Ltd and was supervised by Guy Seddon and the project was managed by Tim Bradley.
- 2.4 The site had previously been the subject of a Desk Based Assessment and an Archaeological Evaluation by MoLAS (Bowsher & Rodenbuesch 2008; Bowsher 2008). The Evaluation had revealed the remains of an early 19th century swimming pool but had failed to find any evidence for either a Tudor road or The Royal Naval hospital Cemetery which were known to occupy the site.
- 2.5 The completed archive comprising written, drawn and photographic records and artefactual material will be deposited with the London Archaeological Archive and Research Centre (LAARC) under the site code NMI 09.



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Figure 1
 Site Location
 1:20,000 at A4

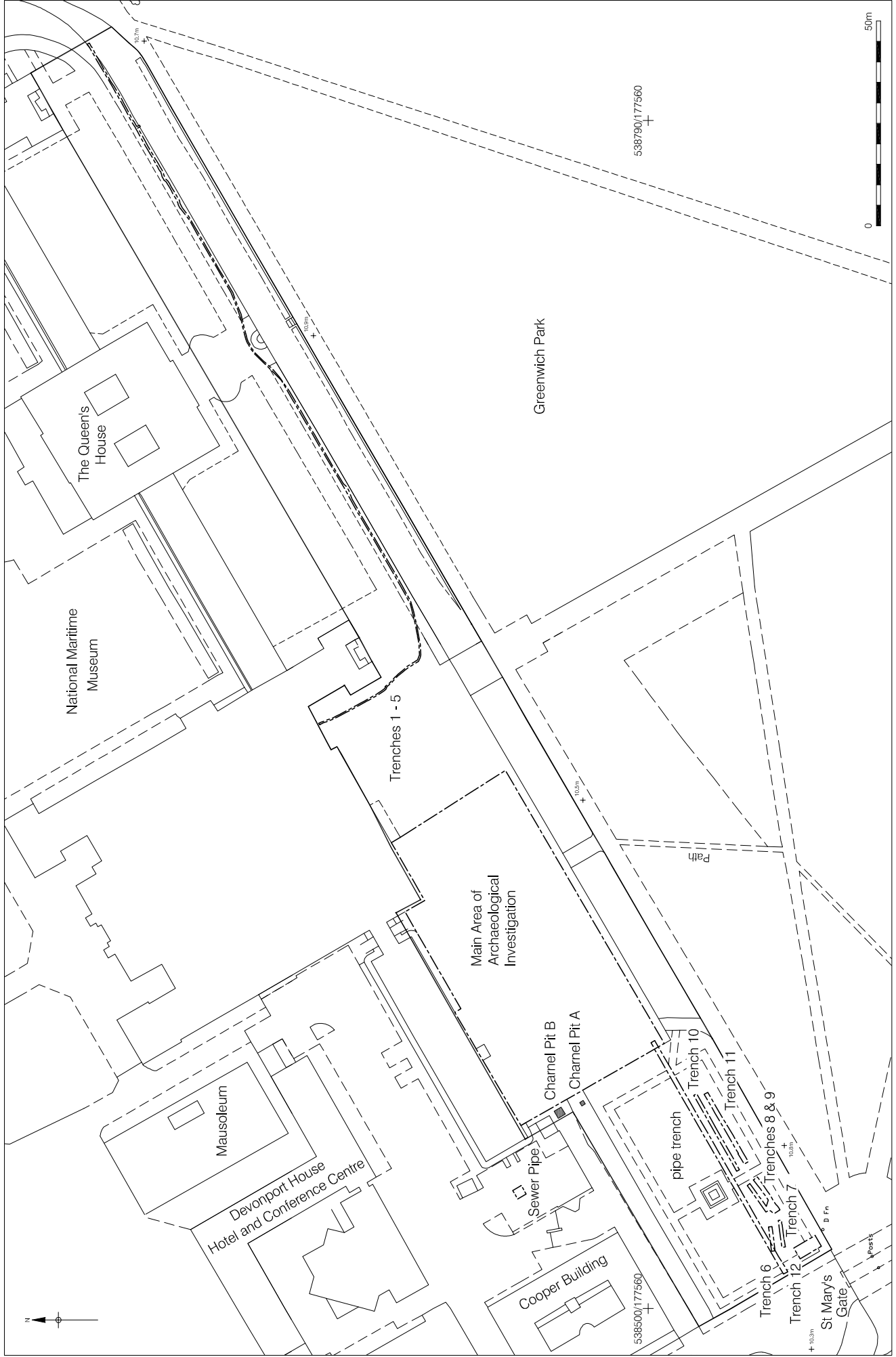


Figure 2
Trench Location
1:1,125 at A4

3 PLANNING BACKGROUND

3.1 Statutory Protection

Maritime Greenwich World Heritage Site

- 3.1.1 The site lies entirely within the Maritime Greenwich World Heritage Site (WHS). The WHS includes the historic centre of Greenwich town with the architectural masterpieces and designed landscape of the Royal Naval College, National Maritime Museum and the Royal Park. Maritime Greenwich was put on the UNESCO list of WHS in June 1996, in recognition of the outstanding universal architectural and historical significance of this group of buildings and spaces.
- 3.1.2 The Maritime Greenwich WHS Management Plan follows the format set out in the UNESCO guidelines for managing World Heritage Sites. It describes and evaluates the site so that the significance of the cultural assets and need to conserve them are fully understood. It states that 'Maritime Greenwich is now ranked among the most famous and prestigious heritage sites in the world' (EH 1999, preface).
- 3.1.3 The Plan identifies the main issues affecting the WHS and suggests the objectives and programmes of action necessary to ensure the holistic and co-ordinated management of it. It provides a framework for the activities taking place in the area, which will ensure that the heritage qualities and character, which make Maritime Greenwich such a special place, are protected. It compliments but does not supersede the local plan drawn up by the London Borough of Greenwich, and supports the strategies and programmes of the agencies and site owners who are working towards the regeneration of the area.

Register of Parks and Gardens of Special Historic Interest

- 3.1.4 The southern edge of the site falls within Greenwich Park, a Grade I Registered Park and Garden of Special Historic Interest. Although inclusion of an historic park or garden on the Register in itself brings no additional statutory controls, local authorities are required by central government to make provision for the protection of the historic environment in their policies and their allocation of resources. Registration is a material consideration in planning terms (PPG15, 2.24) so, following an application

planning authorities must, when determining whether or not to grant permission, take into account the historic interest of the site.

- 3.1.5 To ensure that local planning authorities have the appropriate professional advice when considering such applications, they are required to consult the Garden History Society on all applications affecting registered site, regardless of the grade of the site (see Central Government Circular 9/95, and summary in Environment Circular 14/97/Culture, Media and Sport Circular 1/97).

Human Remains

- 3.1.6 The site falls within the Greenwich Hospital burial ground and may contain burials. Under the *Town and Country Planning (Churches, Places of Worship and Burial Grounds) Regulations 1930*, the removal and re-interment of human remains should be in accordance with the direction of the local Environmental Health Officer.
- 3.1.7 According to the most recent Ministry of Justice circular (MoJ April 2008), exhumation licence applications under *Burial Act 1857* will be considered wherever human remains are buried in sites to which the *Disused Burial grounds (Amendment) Act 1981* or other burial ground legislation does not apply (see below). This will reverse the recent change of practice and is expected to apply to the majority of archaeological excavations. When licenses are issued, a time limit, normally of up to two years, will be set for re-interment of human remains; it will be possible to apply for an extension when circumstances justify this.
- 3.1.8 The 1981 Act and other burial ground legislation will be regarded as applying only to extant burial grounds, in use or disused, which have not evidently been put to some other use. This legislation will not be regarded as applying to burial grounds which have been previously cleared of human remains, which have been built over or otherwise converted to commercial or residential use, or which have been put to agricultural use or have become uncultivated countryside. This approach will mean that relatively few burial sites of interest to archaeologists are likely to be subject to this legislation with the additional requirements it imposes. For sites to which the 1981 Act and similar acts apply, directions will set a time limit, normally of up to 2 years, for re-interment of human remains; it will be possible to apply for an extension when circumstances justify this.
- 3.1.9 When burials are expected or may be present it is advisable to apply to the Ministry of Justice in good time to clarify the status of the site and whether either Act applies. If

human remains are encountered unexpectedly, it is unlikely that either Act applies but the Ministry of Justice are willing to advise where there is any doubt. There is nonetheless the expectation, both ethically and under common law, that all human remains will be treated with respect.

3.2 National Planning Policy Guidance

Archaeology

3.2.1 Planning Policy Guidance Note 16: Archaeology and Planning (PPG16) sets out the Secretary of State's policy on archaeological remains, and provides recommendations subsequently integrated into development plans. The key points in PPG16 can be summarised as follows:

Archaeological remains should be seen as a finite and non-renewable resource, and in many cases highly fragile and vulnerable to damage and destruction. Appropriate management is therefore essential to ensure that they survive in good condition. In particular, care must be taken to ensure that archaeological remains are not needlessly and thoughtlessly destroyed. They can contain irreplaceable information about our past and the potential for an increase in future knowledge. They are part of our sense of national identity and are valuable both for their own sake and for their role in education, leisure and tourism.

Where nationally important archaeological remains, whether scheduled or not, and their settings, are affected by a proposed development there should be a presumption in their physical preservation.

If physical preservation *in situ* is not feasible, an archaeological excavation for the purposes of 'preservation by record' may be an acceptable alternative. From an archaeological point of view, this should be as a second best option. Agreements should also provide for subsequent publication of the results of any excavation programme.

The key to informed and reasonable planning decisions is for consideration to be given early, before formal planning applications are made, to the question of whether archaeological remains are known to exist on a site where development is planned and the implications for the development proposal.

Planning authorities, when they propose to allow development which is damaging to archaeological remains, must ensure that the developer has

satisfactorily provided for excavation and recording, either through voluntary agreement with archaeologists or, in the absence of agreement, by imposing an appropriate condition on the planning permission.

Built Heritage

- 3.2.2 In 1994, the Department of the Environment published its *Planning Policy Guidance Note 15: planning and the historic environment* (PPG15). This sets out the Secretary of State's policy on the visible remains of historic buildings, spaces and structures, and provides recommendations many of which have been integrated into local planning development plans. The key points in PPG15 can be summarised as follows:

It is fundamental to the Government's policies for environmental stewardship that there should be effective protection for all aspects of the historic environment. The physical survivals of our past are to be valued and protected for their own sake, as a central part of our cultural heritage and our sense of national identity. They are an irreplaceable record which contributes, through formal education and in many other ways, to our understanding of both the present and the past.

The Secretary of State attaches particular importance to early consultation with the local planning authority on development proposals which would affect historic sites and structures, whether listed buildings, conservation areas, parks and gardens, battlefields or the wider historic landscape. There is likely to be much more scope for refinement and revision of proposals if consultation takes place before intentions become firm and timescales inflexible.

Local planning authorities should also consider, in all cases of alteration and demolition, whether it would be appropriate to make it a condition of consent that applicants arrange suitable programmes of recording of features that would have been destroyed in the course of the works for which the consent is being sought.

3.3 Regional Guidance: The London Plan

- 3.3.1 The over-arching strategies and policies for the whole of the Greater London area are contained within the GLA's London Plan (Feb 2008) also include statements relating to archaeology:

Policy 4B.15 Archaeology

The Mayor, in partnership with English Heritage, the Museum of London and boroughs, will support the identification, protection, interpretation and presentation of London's archaeological resources. Boroughs in consultation with English Heritage and other relevant statutory organisations should include appropriate policies in their DPDs for protecting scheduled ancient monuments and archaeological assets within their area.

3.4 Local Planning Policy

3.4.1 The Greenwich Unitary Development Plan was adopted on the 20th July 2006. While the first Local Development Framework (LDF) is being produced (planned to be completed in 2010), the Greenwich UDP will continue to serve as the statutory Development Plan for the borough (together with the London Plan). The document sets out the local authority's policies in relation to archaeology and adheres to the principles of national planning guidance PPG16 (see above). The relevant policies in relation to archaeology are set out below:

D30 The Council will expect applicants to properly assess and plan for the impact of proposed developments on archaeological remains where they fall within 'Areas of Archaeological Potential' as defined on the constraints Map 10. In certain instances preliminary archaeological site investigations may be required before proposals are considered. The Council will seek to secure the co-operation of developers in the excavation, recording and publication of archaeological finds before development takes place by use of planning conditions/legal agreements as appropriate.

D31 At identified sites of known archaeological remains of national importance, including scheduled monuments, there will be a presumption in favour of physical preservation of the remains in situ and to allow for public access and display to preserve their settings. For sites of lesser importance the Council will seek to preserve the remains in situ, but where this is not feasible the remains should either be investigated and removed from the site, or investigated, excavated and recorded before destruction. Appropriate conditions/legal agreements may be used to ensure this is satisfied.

Reason

6.50 Archaeological remains are a finite and fragile resource vulnerable to modern developments. PPG16 gives guidance on how archaeological remains should be preserved or recorded. It recommends that UDPs should

include policies for the protection, enhancement and preservation of sites of archaeological interest and of their settings, as well as a map defining where these policies apply. The Borough's archaeological heritage represents a local community asset that is desirable to preserve and utilise both as an educational and recreational resource. The objectives of new development can often conflict with the need to preserve, or to remove and record such remains. Potential developers should be alerted early on in the planning process of likely remains so as to secure their preservation. Early discussion with the Council and English Heritage is encouraged. The support of local archaeological groups is essential to this process. The potential for discovery of significant remains in large areas of the Borough is high, whilst the opportunity to record and preserve such finite resources is usually restricted to one occasion. The Greenwich Heritage Centre is a potential location for the retention of remains.

6.51 The Council will also:

- i. Pursue land use policies which are sensitive to the potential threat development can pose to archaeological remains and adopt a flexible approach to the design of new development in areas where preservation of archaeological remains is paramount.

- ii. Encourage co-operation amongst landowners, developers and archaeological groups by promoting the principles laid down in the British Archaeologists and Developers Liaison Group Code of Practice.

- iii. Encourage developers to allow an appropriate level of archaeological investigation where significant remains are unexpectedly discovered during construction, and if applicable make provision for the preservation or recording of such finds by a recognised archaeological organisation.

3.4.2 The site falls entirely within an Area of Archaeological Potential as defined by the local authority.

4 GEOLOGY AND TOPOGRAPHY

- 4.1 The site lies in the south-west corner of the Museum grounds, between Greenwich Park to the south, the University of Greenwich site to the north and bounded by King William Walk to the west, Greenwich Park to the south and by the National Maritime Museum and pedestrian access ways to the east. The site falls within the historic parish of Greenwich and lay within the county of Kent before being absorbed into the administration of the Greater London Borough of Greenwich.
- 4.2 The site is located on fairly even ground within the base of the Thames Valley, sloping from an average of 10.65m Ordnance Datum (OD) in the south to an average of 10.40m OD in the north. Within Greenwich Park, 200m to the south of the site, the Thames Valley escarpment rises sharply to 46m OD on the Blackheath Plateau. The site lies some 420m inland from the modern south bank of the River Thames.
- 4.3 The underlying geology is Upper Chalk of the Cretaceous period (BGS Sheet 270). Layers of the Palaeocene period – Thanet Sands, the Woolwich and Reading Beds and the Blackheath Beds – were cut away by the Thames escarpment about 500,000 years ago, during the mid Quaternary period.
- 4.4 Since then, the resultant valley has been subject to constant erosion and has filled with more recent drift deposits. Within the area of the site, these will be the Flood Plain, or Shepperton, gravels that were deposited at the end of the last glaciation, some 15,000 years ago. These gravels cover a limited area along the riverfront of central Greenwich and thus represent the focus of early settlement in the area. Overlying these gravels are occasional layers of sand and colluvial silt deposits (i.e. hillwash).

5 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

5.1 The following information is largely based on the Desk Based Assessment undertaken by MoLAS in 2008 (Bowsher & Rodenbuesch 2008).

5.2 Prehistoric period (c. 700,000 BC-AD 43)

5.2.1 The Lower (c. 700,000 – 250,000 BC) and Middle (c. 250,000 – 40,000 BC) Palaeolithic saw alternating warm and cold phases and intermittent, perhaps seasonal occupation. During the Upper Palaeolithic (c. 40,000 – 10,000 BC), after the last glacial maximum and in particular after around 13,000 BC, further climate warming took place and the environment changed from being a treeless steppe-tundra to one of birch and pine woodland. It is probably at this time that this part of England saw continuous occupation. The Mesolithic hunter-gatherer communities of the postglacial period (c. 10,000 – 4,000 BC) inhabited a still largely wooded environment. The river valleys and coast would have been especially favoured in providing a predictable source of food (from hunting and fishing) and water, as well as a means of transport and communication. Evidence of human activity is largely characterized by finds of flint tools and waste rather than structural remains.

5.2.2 The Neolithic (c. 4,000 – 2,000 BC), Bronze Age (c. 2,000 – 600 BC) and Iron Age (c. 600 BC – AD 43) are traditionally seen as the time technological change, the establishment of farming and settled communities, and forest clearance occurred for the cultivation of crops and the construction of communal monuments, and with increasing population and pressure on available resources throughout that period.

5.2.3 To date no settlements of prehistoric date have been found within the area. Isolated flint artifacts have, however, been found along the Thames foreshore; many might have rolled downhill within colluvial movements. It was reported that 'several stone implements and flint chippings were found in the Park at Crooms Hill in 1846' (Webster 1902, 1).

5.2.4 Many Mesolithic and Neolithic stone artefacts and Bronze Age metalwork have been found in the Thames at Greenwich. These are interpreted as ritual depositions in the river. Some of the numerous round barrows identified within Greenwich Park may be of Bronze Age date. It was fairly common for Saxons to locate burials in older (Bronze Age) barrow cemeteries (Welch 1995). These sites and finds indicate the presence of prehistoric activity within the general area.

5.3 Roman period (c AD 43 – 410)

- 5.3.1 The nearest Roman settlements are attested well to the east (Woolwich) and west (Deptford). However, a probable Romano-British temple was recorded c 700m to the south-east in Greenwich Park, and funerary urns are known from Blackheath. A 'stone coffin' of purportedly Roman date, was said to have been found on the western side of Greenwich Park in 1873 (Webster 1902, 1) and may further suggest the antiquity of the Crooms Hill route. Another Roman 'site', an earthwork, originally investigated in 1906, is now thought to lie in the south-east corner of Greenwich Park, to the south of the site. Isolated fragments of Roman pottery have been found within the Royal Naval College ground to the north of the site and farther afield. A fragment of a Roman helmet was also found in the river, north of the site.
- 5.3.2 Roman activity was presumably related to the line of the Roman road known as *Watling Street* as it passed through the area on its way from London to Dover. Its course has not been observed archaeologically within Greenwich but it is suggested that it ran diagonally across Greenwich Park, passing out of it in or just to the south of the Park.

5.4 Saxon Period (AD 410 – 1066)

- 5.4.1 Following the withdrawal of the Roman army from England in the early 5th century AD the whole country fell into an extended period of socio-economic decline. Around the 9th and 10th century, the local parochial system began to replace the earlier Saxon Minster system, with formal areas of land centered on nucleated settlement served by a parish church. Permanent settlement in Greenwich seems to have begun in the Saxon period, as the etymology of the name also suggests. Greenwich was *Grenewic* or the Green Village indicating an early settlement (VCH Kent I, 340-71). The etymology of Crooms Hill road, which forms the site's western boundary has been thought to derive from *crumb* – the Saxon word for crooked. The manor of East Greenwich was certainly a royal holding by AD 964, when it was given to the Abby of St Peter in Ghent (Belgium), in whose hands it remained until finally confiscated by the crown in 1415.
- 5.4.2 The Saxon village of Greenwich most likely began closer to the riverfront. Later it probably extended southwards to the area of St Alphege Church (200m to the north-west of the site), which is thought to be sited on the location of Alphege's martyrdom in AD 1016.

5.4.3 There is extensive evidence for Middle Saxon (7th century) burial activity, which would normally be situated away from the settlement center. A large barrow cemetery survives on high ground in the south-west of Greenwich Park, c. 500m south-east of the site. Another separate, albeit undefined, Middle Saxon burial ground is known from an area in the north-eastern part of the National Maritime Museum grounds, just to the east of the site. Isolated Late Saxon (11th century) pottery fragments have also been found in the Museum grounds to the east of the site.

5.5 Medieval Period (AD 1066 – 1485)

5.5.1 There are numerous references to the flourishing fishing village of Greenwich in the medieval period. Settlement was almost certainly concentrated on the riverside but, like its Saxon predecessor, tapered southwards to and beyond the parish church. There were roadways through the park, the most prominent running diagonally to the north-west, which was probably Roman in origin. As mentioned above, the road known as Crooms Hill is also of, at least medieval origin. It is probable that the road layout in the settlement area, which survived until the early 19th century, was medieval in origin.

5.5.2 There must have been some royal presence by 1408, when Henry IV signed his will at Greenwich. Indeed it is from the early 15th century that the most important alterations to the topography of Greenwich occurred, through royal development. Ghent's tenure of Greenwich was ended in 1414 and in 1426, the manor eventually passed to Humphrey, Duke of Gloucester (brother of Henry V). In 1433, Humphrey enclosed an estate that roughly comprised of the area now formed by the Old Royal Naval College, the National Maritime Museum and Greenwich Park. He was allowed to close the roadway, noted above, that ran through the park but was asked to make a new route which also formed the eastern boundary – now known as Maze Hill. Crooms Hill formed the western boundary.

5.6 Post-medieval period (AD 1485 – present)

5.6.1 Greenwich entered the world stage under the Tudors. A large riverside palace was built by Henry VII, located in the Royal Naval College grounds c. 300m north of the site. To the south lay gardens and orchards but, in 1515 Henry VIII laid out a tiltyard partly in the area of the National Maritime Museum East Wing and the Queen Mary Quarter of the Old Royal Naval College, c. 100m north-east of the site. The last great addition to the Tudor palace complex was the Queen's House, c. 70m north-east of

the site, completed in 1635. By 1624, the original 'pale' surrounding the Park had been replaced by a 12ft high brick wall.

- 5.6.2 The main Deptford – Woolwich highway ran through the site from at least the 16th century. Its circuitous line ran along Woolwich High Road, turning south up Park Vista and west along a line now marked by the 1807 colonnades either side of the Queen's House. According to a map of c. 1720, it turned to the south-west at the junction of Friars Road. A more detailed plan of c 1760, however, shows it running along the north side of the present South Wing, then veering slightly to the south-west where it turned again westwards along the line of Nevada Street to the Junction of Crooms Hill and Stockwell Street. Within the area of the site the road was known as Heath Gate Street.
- 5.6.3 The roadway was lined with walls to protect royal privacy from at least the mid 16th century. They were known to have been re-built in 1624 and stretches of the walls have been recorded on a number of occasions.
- 5.6.4 No evidence of the roadway was revealed during the evaluation conducted on the present site in 2008 (Bowsher 2008).

Copped Hall – Weston's Academy

- 5.6.5 From at least 1547 the area of the site was occupied by an important estate known as Copped Hall (TNA ADM 75/27; Drake 1886, 80; Sloan 1984, 317-8). Copped Hall mostly lay below the present Cooper Building to the immediate north-west of the site. However, its south-western part extended into and just south of the access road from King William Walk.
- 5.6.6 It is not known when the property was built but, in 1547 it belonged to William Roper (1498 – 1578, son-in-law of Sir Thomas More). In 1554, Roper sold the site, now described as within an eight acre estate with two smaller tenements on the north side of Heath Gate Street, to John Heyton who renamed the building Heyton Hall, and leased it to John Norris. In 1626, Richard Heyton sold it to a Mr Hanchett. In 1676 it was bought by Edward Peachey, when it was described as 'that capital tenement commonly called Heyton Hall and appurtenances, orchard and garden tenements of 8 acres surrounded by a brick wall'. From 1694 it was leased to Robert Goddard. When Greenwich Hospital bought the estate from William Peachey in 1715 the hall was rented by Thomas Weston and housed the academy that became the nucleus of the Greenwich Hospital School.

- 5.6.7 To the east of Copped Hall, against the south side of the old roadway, was a probable inn called The Naked Boy. This is marked on a c. 1720 map and appears to have lain in the area of the yard on the west side of the South Wing, in the center-north of the site.

Burial Grounds

- 5.6.8 The Royal Hospital Greenwich secured the northern half of the estate for a burial ground in 1747. Within this area, a number of burials were exhumed during construction of the cut-and-cover London to Greenwich railway in 1878. Burials were also excavated during the construction of the Devonport Building in 1925.
- 5.6.9 In 1782, Greenwich Hospital decided to demolish Copped Hall, the 1759 school room and other properties on King Street. In its place a new school building designed by William Newton was built between 1782 and 1784, c. 40m north-west of the site. Despite the new building lying within the burial ground, the cemetery was now extended to the south, where it was bounded by the former Highway. To the north the burials were bounded by Romney Road and by King Street, (now King William Walk) to the west. What with the high death rate the area soon filled up and the cemetery was closed in 1857.
- 5.6.10 Excavations by Oxford Archaeology between 1999 and 2001 immediately to the north of the present area of investigation uncovered a total of 107 skeletons from 55 graves (Boston *et al.* 2008). No human remains were revealed during the Archaeological Evaluation on the present site in 2008 by MoLAS (Bowsher 2008).

School Buildings

- 5.6.11 On the transfer of the Queen's House to Greenwich Hospital in 1807, a major construction programme created larger school premises. The colonnades built along (part of) the old roadway, north-east of the site, linked the Queen's House with the new East Wing and the West (Central) Wing. The work was completed by 1814. There was a further expansion towards the site in 1862, when the West Central Wing and the South Wing, designed by Philip Hardwick, were built to the immediate north-east of the site. Finally, the Neptune hall, (now Court) was added to the immediate north-west, outside the site, and the South West Wing, located within the northern bounds of the site in 1874.
- 5.6.12 Two developments in the south-western parts of the school grounds lay within the present site. Outside the school grounds, St Mary's Church was built to the designs of George Basevi in 1825. This lay partly on the former roadway, in the area of the

present day King William Garden. The church was under the wing of St Alfege's and was built from local subscriptions because of overcrowding at the parish church. The ground was consecrated on 25th July 1825. The church could seat as many as 1700 and had extensive vaults beneath. But by the time of the end of the First World War the congregations has decreased to such an extent that the church was run down and neglected (Clarke 1998, 2).

5.6.13 A swimming pool was built to the designs of Joseph Kay in 1833, in the eastern area of the site. Swimming pools of this size (30m x 19m) were extremely rare before the late 19th century. The use of mass concrete at this date was most innovative, only used elsewhere by the architect Robert Smirke at Middle Temple Lane and King's College, Strand in the same period. A brick lining was added only six years later, due to problems with water retention, and it was finally roofed in 1875. A block of latrines was added just to the east of the pool in the mid 19th century. The remains of the swimming pool were revealed during the Archaeological Evaluation on the site in 2008 (Bowsher 2008).

5.6.14 St Mary's Church, the swimming pool and associated latrines were all demolished in 1936 and the area was landscaped for gardens. It is documented that the vaults of the church were filled in and the coffins remained. A memorandum written by the last vicar of St Mary's, Rev. O.H. Thomas, is as follows:

"On completion of the demolition of St Mary's Church and the filling in of the site in 1936 the coffins buried in the vaults of the said crypt rested on the floor of the vaults surrounded by earth and the new ground level of the site was from six feet six inches above the level of the vault floors" (Clarke 1998, 7).

The vicar recorded the coffins prior to their burial in 1936. A total of 355 were identified by name which would suggest that more without names were present. The earliest burial was in 1825 with the last being in 1914 (Clarke 1998,7-9).

5.6.15 The school moved site to Suffolk in 1934 and after a period of restoration the National Maritime Museum was opened in 1937.

6 ARCHAEOLOGICAL METHODOLOGY

- 6.1 Initially the archaeological investigation consisted of two small watching briefs. The first was to monitor a pipe trench in the rose gardens to the east of the site (Trenches 1-5) whilst the second monitored exploratory trenches (Trenches 6-12) within the King William Garden, to the west of the site (Fig. 2).
- 6.2 A Written Scheme of Investigation (Bradley 2009a) detailed the methodology for the main investigation centred in the development of the Sammy Ofer Wing (Fig. 2), to which 2 later addendums were made (Bradley 2009b; 2009c). The methodology employed was one of 'Pro-active Observation & Recording' with stripping of modern material by machine being monitored by an archaeologist until archaeological sensitive deposits and structures were encountered. The contractors' programme necessitated the site being stripped in two phases with Zone 1, encompassing the southern part of the new footprint, stripped first and then Zone 2, the northern part, undertaken subsequently.
- 6.3 Removal of the overlying material was done under archaeological supervision, with 360 degree, tracked, machines, the sizes of which varied in size according to the necessity of the work being done.
- 6.4 In Zone 1 the overlying material was removed within the area of the swimming pool, down to the latest surviving surfaces and walls of the pool, so that half of the structure was exposed, in order for them to be recorded.
- 6.5 After the exposure of Zone 1 the methodology for Zone 2 was changed in agreement with English Heritage, so that the entirety of the northern section did not have to be exposed. Five targeted slip trenches were to be excavated instead. These ran parallel to each other on a north-south alignment, beginning at the eastern edge of the site. One trench focused on the eastern edge of the pool-house, three targeted the concrete 'island' and one exposed the western limit of the pool.
- 6.6 After recording of Zone 1 had taken place the base was broken out and the walls were pulled into itself and further ground reduction took place, in the area of the pool and to the south of the structure, all under archaeological supervision, with excavations of any features found being conducted by hand. At the same time archaeological investigations continued in Zone 2.

- 6.7 After the recording of Zone 2, it was broken out in the same manner as Zone 1 and the outlying area to the north of the pool structure was reduced with a machine under archaeological supervision, with hand excavation of any archaeological features that were observed.
- 6.8 Further monitoring was required when human bone was revealed by contractors during the replacement of a broken sewer pipe and when two 20th century charnel pits were uncovered in the western area of the site. The human bone was recorded and reburied immediately on the site. The excavation of a 60m length of pipe trench across the site of St Mary's Church was also monitored. This revealed the tops of 9 lead coffins within the crypt of the church. In order to minimise disturbance of the coffins, once their presence had been determined their position was logged but no cleaning or detailed recording was attempted. The coffins were preserved *in situ* with the level of the new service being raised in order not to impact on the lead coffins, which were protected with a layer of shingle.
- 6.9 A GPS machine was used to survey the entirety of the site and to record baselines where detailed hand drawn records were carried out.
- 6.10 The Written Scheme of Investigation specified the proportion of the different feature types to hand excavate.
- Non-structural linear features (ditches, field boundaries, drainage gullies, etc) were sampled at a ratio of at least 10% by length.
 - All pits and postholes were excavated to at least 50% by volume.
- 6.11 The recording system used was the single context recording system with individual descriptions of all archaeological strata and features excavated, exposed and entered onto pro-forma recording sheets. All plans and sections of archaeological deposits were recorded on polyester based drawing film, the plans being drawn at a scale of 1:20 and 1:100 and the sections at 1:10. The OD height of all principal strata were calculated and indicated on the appropriate plans and sections. Features that were evidently modern, apart from one instance, were not given context numbers, and were recorded as modern intrusions in plan.
- 6.12 A level was traversed in from a Bench Mark on King William Walk to the east of the study site, with a value of 10.15m OD.

- 6.13 Photographs, on colour slide and black and white print film, were taken of the archaeological features where relevant. A professional archaeological photographer came to the site when required to take large format shots of areas or specific features, and a photographic tower was erected to get the area overview shots. Site staff used 35mm cameras and digital cameras on a day-to-day basis, and the professional archaeological photographer used 35mm, medium format (120mm) and digital cameras.
- 6.14 In this report, contexts are shown by square brackets, e.g. [100] and are divided into the following ranges:
- [1] - [66] are from the initial Watching Briefs
 - [67] - [298] are from the main investigation

7 PHASED ARCHAEOLOGICAL SEQUENCE

7.1 PHASE 1: NATURAL

7.1.1 The earliest deposits seen on site were Shepperton Gravels, recorded as [15], [66], [173] and [191]. They had a height of 9.79m OD to the south of the site falling to 8.53m OD in the north.

7.2 PHASE 2: MEDIEVAL (Fig. 3)

7.2.1 This phase is represented by two pits, [206] & [226], and a ditch, [207]/[209]. Pit [206] measured 2.20m by 1.35m and had a depth of 0.54m. Its fill, [205], was a firmly compacted, mid brownish grey, silty sand containing animal bone.

7.2.2 Pit [226] was sub-oval in plan, measuring 1.85m by 1.75m, with a depth of 0.30m. Its fill, [225] was a firmly compacted dark greyish brown with red mottles and was formed of sandy silt. It contained moderate amounts of charcoal flecking and sherds of pottery dating to 1170-1350, ceramic building material (cbm) and an iron bracing which may be intrusive.

7.2.3 Ditch [207]/[209], was L-shaped in plan, with one branch on a northerly alignment with the second branch spurring off its southernmost end in an eastern direction. It measured 0.92m north-south and 2.60m east-west, (before truncation by the later pool), with a width of 0.45m and a depth of 0.14m. Its fill, [208]/[210], was a firmly compacted mid orange/grey silty sand which did not contain any finds.

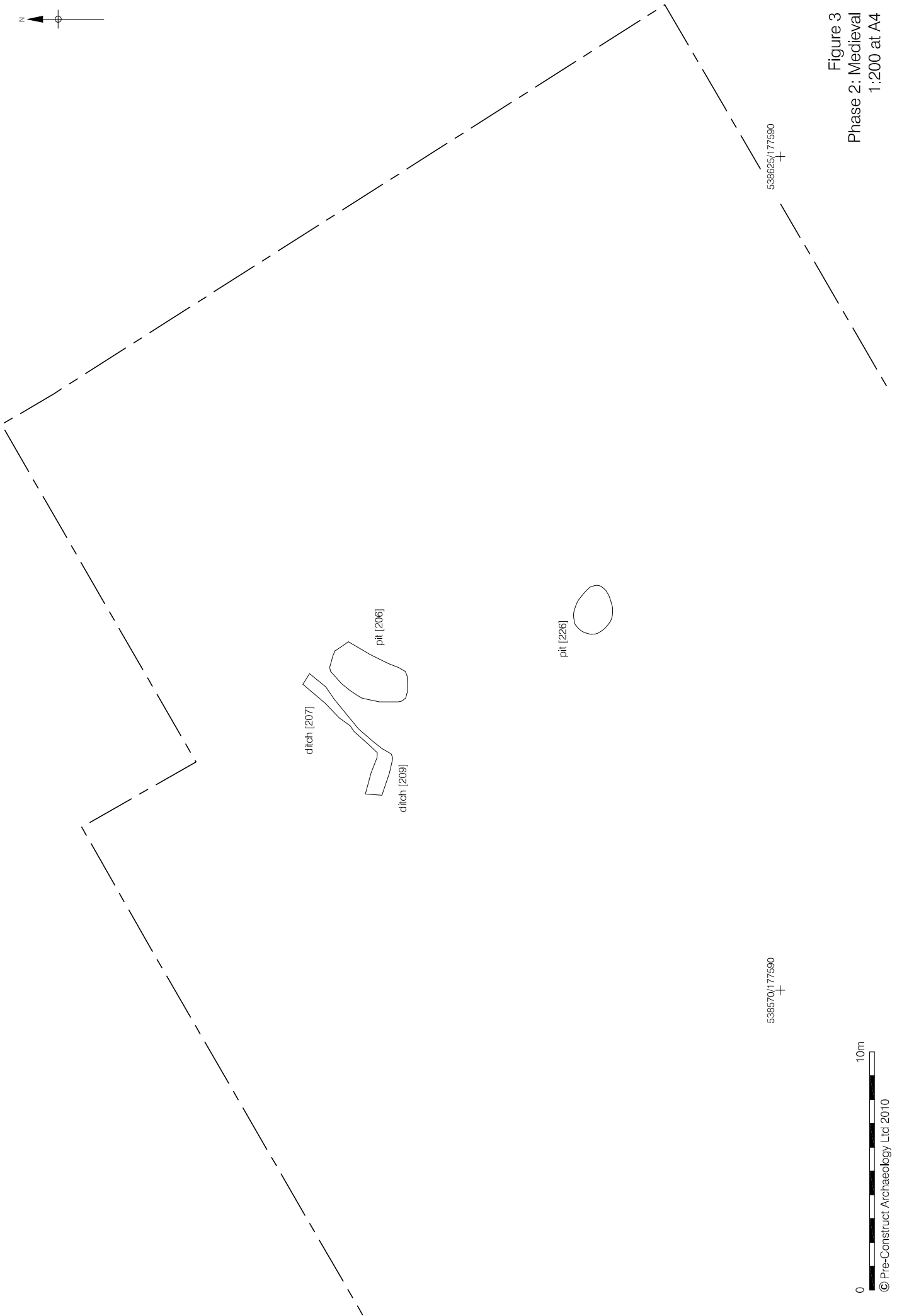
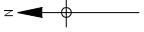


Figure 3
Phase 2: Medieval
1:200 at A4



538570/177590
+

538625/177590
+

7.3 PHASE 3: 16TH CENTURY (Figs. 4 & 5, Plate 1)

- 7.3.1 The only feature assigned to this phase was a roadway. It comprised many contexts, but was given the overall group number of [239]. It was aligned north-east to south-west survived intact for a length of 23.80m, had a width of 4.56m and a maximum thickness of 0.93m in the east, thinning to only 0.18m in the west. It had suffered horizontal truncation along its length and five drain inspection chambers had been cut through it at the eastern end. The western end had been totally truncated by the construction of the Regatta Café and the eastern end by the National Maritime Museum.
- 7.3.2 The road was originally constructed by excavating a cut into the natural gravels. This was then partially backfilled with a deposit of light grey sandy silt [270] to form a foundation for the road surface itself which was constructed from a layer of compacted dark brown sandy gravels [275]. Numerous wheel ruts were observed along its length, and the road was subject to constant repairs consisting of the deposition of material containing high amounts of clinker and sandy silts, [269], [271], [272], [273] & [274], along its length to fill the ruts and level the ground in preparation for a new gravel surface [277]. Finds were particularly sparse from the road but repair layers [260], [262] and [267] contained quantities of unfroged bricks, dated to between 1450 and 1700.
- 7.3.3 Running parallel to the north of the road surface was a roadside ditch [298]. This had steep sides that broke sharply from the surface, sloping towards a slightly concaved base. Like the road surface the ditch had suffered from severe truncation and survived for a length of only 12.00m. It had a width of 1.90m and a depth of 0.55m. Its fill, [297], was a loose to firmly compacted mid to light brownish grey silty sand containing occasional small sub-rounded and sub-angular stones. Fragments of cbm, dating to 1600-1700, animal bone and neck of a ceramic jar dated to between 1550 and 1700 were recovered from the ditch.

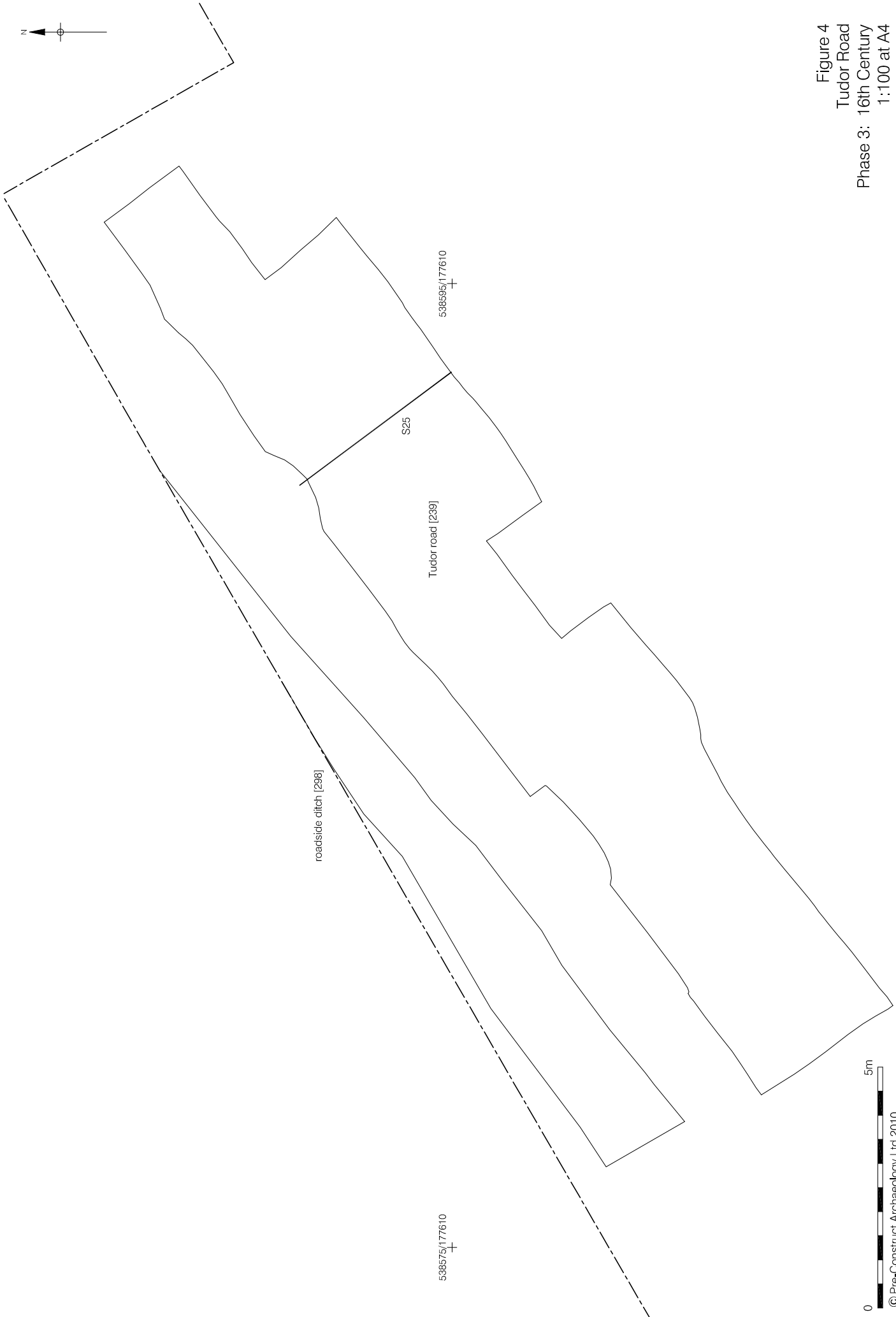
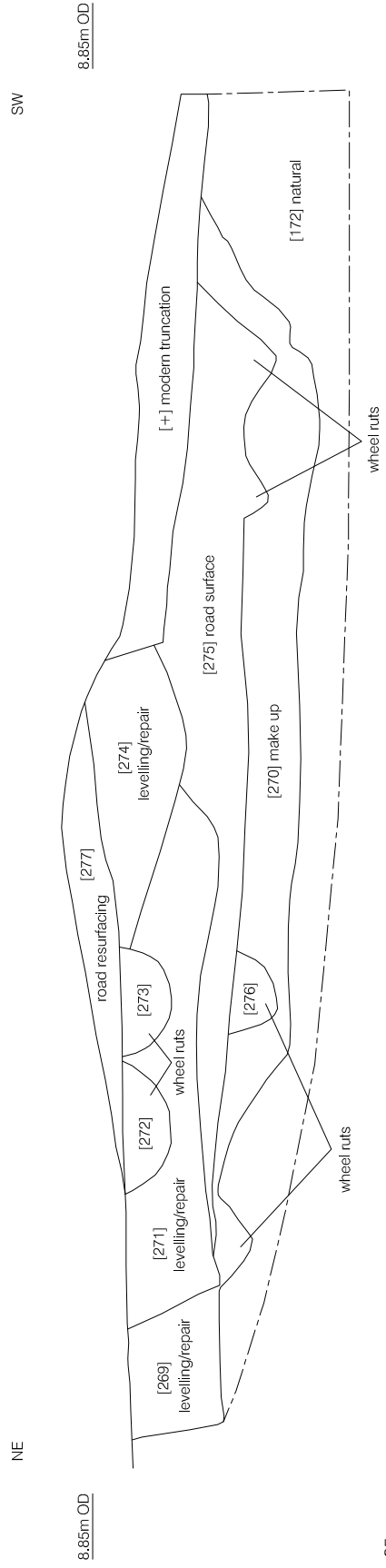


Figure 4
Tudor Road
Phase 3: 16th Century
1:100 at A4



Section 25
Tudor Road
Southwest Facing



Figure 5
Section 25
1:25 at A4

7.4 PHASE 4: 1749 - 1823

7.4.1 This phase is represented by inhumations, together with a small cellar, a boundary wall, five brick drain runs and a well.

Inhumations (Fig. 6)

7.4.2 In total 17 inhumation burials were located within 7 grave cuts, [230], [233], [244], [250], [280], [287] and [296]. Eleven of the burials were male, two female and four were of indeterminate sex. All the grave cuts were aligned east-west, though cut [287] was noticeably on more of a northeast-southwest alignment than the others.

7.4.3 All the grave cuts were sub-rectangular in plan, with sharp breaks of slope from the surface, steep near vertical sides and flat bases. Grave [244] truncated grave [287] and graves [230] and [250] cut through the northern edge of the road surface [239], with all the other grave cuts cutting into horticultural soil [171], which had been built up over across the site and sealed roadside ditch [298].

7.4.4 The fills of all the graves, except that of [287] were loose-firmly compacted, light-mid greyish brown sandy silts, containing occasional small fragments of building material, and occasional-moderate amounts of small sub-angular and sub-rounded stones. The fill of grave [287], [284], however contained very frequent crushed and fragmented lime mortar and cbm.

7.4.5 Where inhumations had collapsed onto each other due to the coffins rotting and were indistinguishable from each other in the field they were numbered up A, B & C and separated in post excavation analysis.

Grave Cut	Length	Width	Depth	Burials
[230]	1.88m	0.60m	0.65m	(229), (241) A/B
[233]	2.00m	0.80m	0.39m	(232), (246)
[244]	1.85m	0.55m	0.40m	(243), (252)
[250]	2.34m	0.68m	0.38m	(248), (282), (291)
[280]	2.24m	0.66m	0.50m	(279), (288), (293)
[287]	1.70m	0.70m	0.63m	(285)
[296]	2.12m	0.60m	0.76m	(295) A/B/C

- 7.4.6 The remnants of decayed coffins and coffin furniture were present around most of the burials. The furniture took the form of handles and coffin plates made from iron and had suffered badly from corrosion.
- 7.4.7 A charnel pit, [237], was also present, the fill of which, [236], contained the disarticulated bones of at least five individuals. This was sub-square in plan with steep sides and a flattish base. It measured 1.60m north-south by 1.40m east-west and had a depth of 0.44m.
- 7.4.8 It is probable that these inhumations relate to the south-eastern corner of the Mariners' Cemetery which is documented to be located in this area from 1749.

Wall and Cellar (Figs. 7 & 8, Plate 2)

- 7.4.8 A wall constructed of unfrogged red bricks, with a date range between 1800 and 1900, was observed in Trenches 1-5 and the main area of investigation and allocated different numbers in each trench. In Trenches 1-5 the wall was observed largely as a series of eleven buttresses, [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [14] measuring 0.61m by 0.61m, which extended into the trench on a northeast-southwest alignment along the southern boundary of the National Maritime Museum site. To the west of these trenches it was exposed as wall [25]. The wall itself, [2], was lay beneath the existing boundary wall and was seen to be at least 0.25m wide. During the main investigation it was observed curving at its western end onto a more north-westerly course, [80] & [214] and was truncated by the later swimming pool, but continuing beyond the later feature running into the northern limit of excavation. This boundary wall was thus observed across the site over a distance of c. 150m, with a width of 0.34m and a height of 0.22m.
- 7.4.9 Constructed against the wall on its northern side at its western end was a cellar, [211] and fragments of earlier masonry. The earlier masonry consisted of elements of a wall on a northeast-southwest alignment which had been truncated by the later cellar. Wall [176] lay to the south of the cellar, whilst masonry [125], [134] and [215] was located to the north with [215] being a later repair or 'bricking up of a gap between [125] and [134]. This wall originally extended over a length of 8.5m and was 0.25m wide and 0.60m high with elements [176] and [215] somewhat wider. It may represent part of a boundary wall.
- 7.4.10 Cellar [211] was rectangular in plan measuring 6.25m east-west by 2.85m north-south and had a depth of 2.02m, the outer walls of which were numbered [127] and [213],

the tops of which were found at 9.59m OD. It had a brick floor, [212], at 7.79m OD, which had five Purbeck limestone bases running down the length of it in two lines of three, (the sixth base being truncated out by a later column base for the pool). At the northern end was an entrance through a small tunnel, [126], [174], [175], which headed north for 1.37m before doglegging south west for a distance of 1.40m. The tunnel terminated abruptly, showing signs of metal fixings on the ground, probably for a ladder used for egress/access to the structure.

Drain Runs (Figs. 6 & 8)

7.4.11 Five drain runs constructed from red bricks were recorded on the site. Four of the drains were located in Trenches 1-5 (Fig. 8), [17] = [18], [23], [27] and [29] = [30].

Context No	Length	Width	Depth	Alignment
[17]=[18]	0.30m+	0.56m	0.42m+	N-S
[23]	0.30m+	0.41m	0.14m+	NE-SW
[27]	0.46m+	0.40m+	0.32m+	Vertical
[29]=[30]	0.30m+	0.88m	0.53m+	N-S

7.4.12 Drain run [227] was located during the main excavation (Fig. 6). It was aligned north-south and had been severely truncated at both ends. The surviving section had a length of 2.50m, a width of 0.60m and a height of 0.10m.

Well (Fig. 7)

7.4.13 Well [196] was sub-circular in plan, measuring 3.08m north-south by 2.80m east-west. It had vertical sides and could only be excavated to a depth of 2.95m for safety reasons. It contained five fills, [192], [193], [194], [195] and [197], which were numbered sequentially as excavation proceeded down the well. Fill [192] was a loosely compacted, light-mid greyish brown silty sand with occasional to moderate inclusions of oyster shell and cbm flecks and fragments and moderate amounts of small sub-angular and sub-rounded stones. Fill [193] was a loosely compacted mid greyish brown silty sand with orange mottles contained occasional cbm flecks and fragments and frequent small sub-angular and sub-rounded stones. Fill [194] was a firmly compacted, light-mid greyish brown sandy silt with orange-brown banding. It had frequent inclusions of small-medium sized sub-rounded and sub-angular stones and occasional flecks and fragments of cbm together with clay tobacco pipe dating to the 18th century. Fill [195] was a loose to firmly compacted light-mid brownish orange, sandy gravel which contained no finds and was very possibly slumping of the natural

into the well. The earliest fill recorded was [197], which was a firmly compacted, mid brownish grey, silty sand with frequent rounded and sub-rounded stones. It contained fragments of cbm dated to between 1800 and 1950, which has to predate 1833 as the swimming pool was constructed over this area in that year, effectively sealing it.

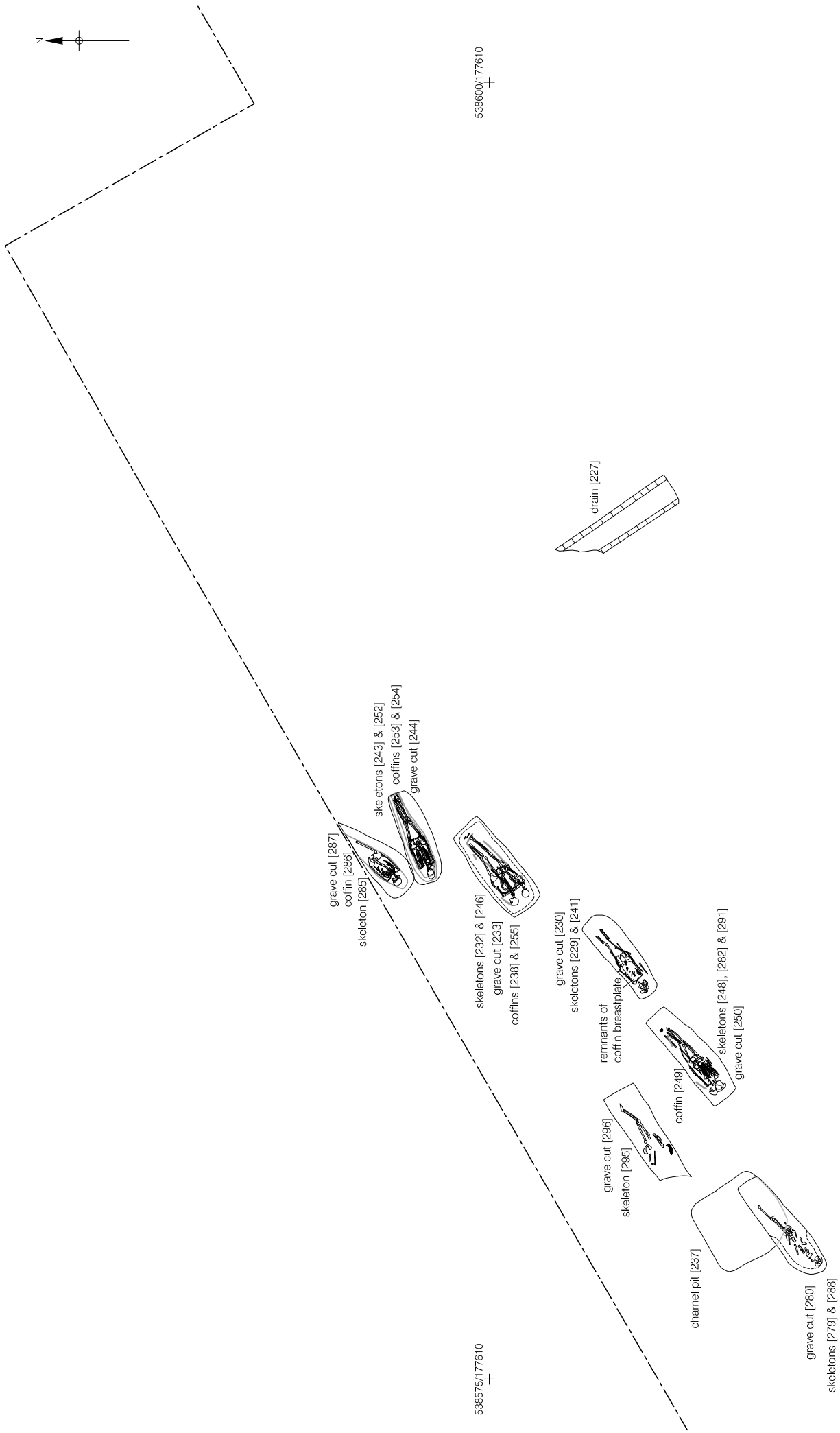


Figure 6
Cemetery
Phase 4: 1749-1823
1:100 at A4



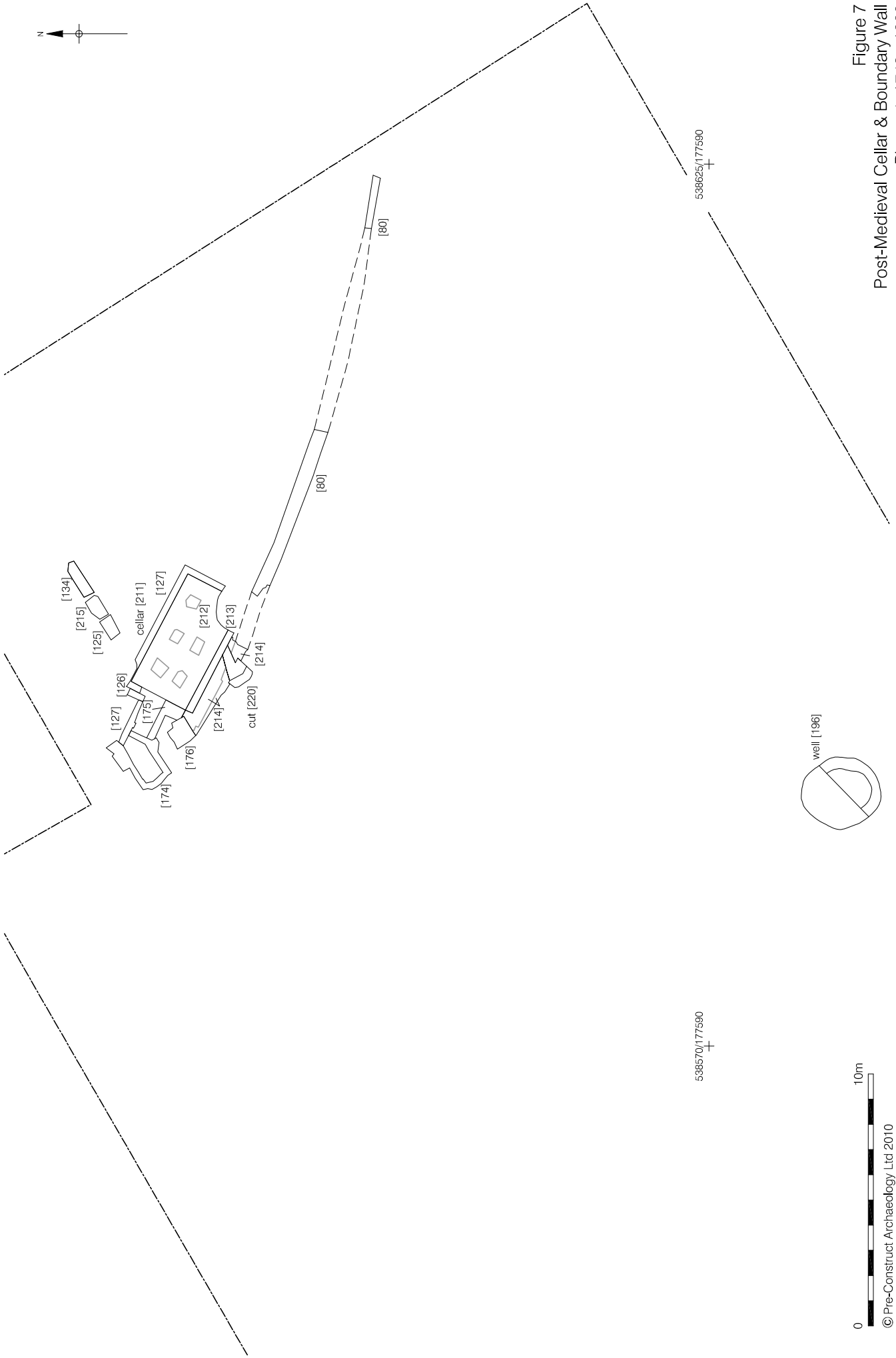


Figure 7
 Post-Medieval Cellar & Boundary Wall
 Phase 4: 1749 - 1823
 1:200 at A4

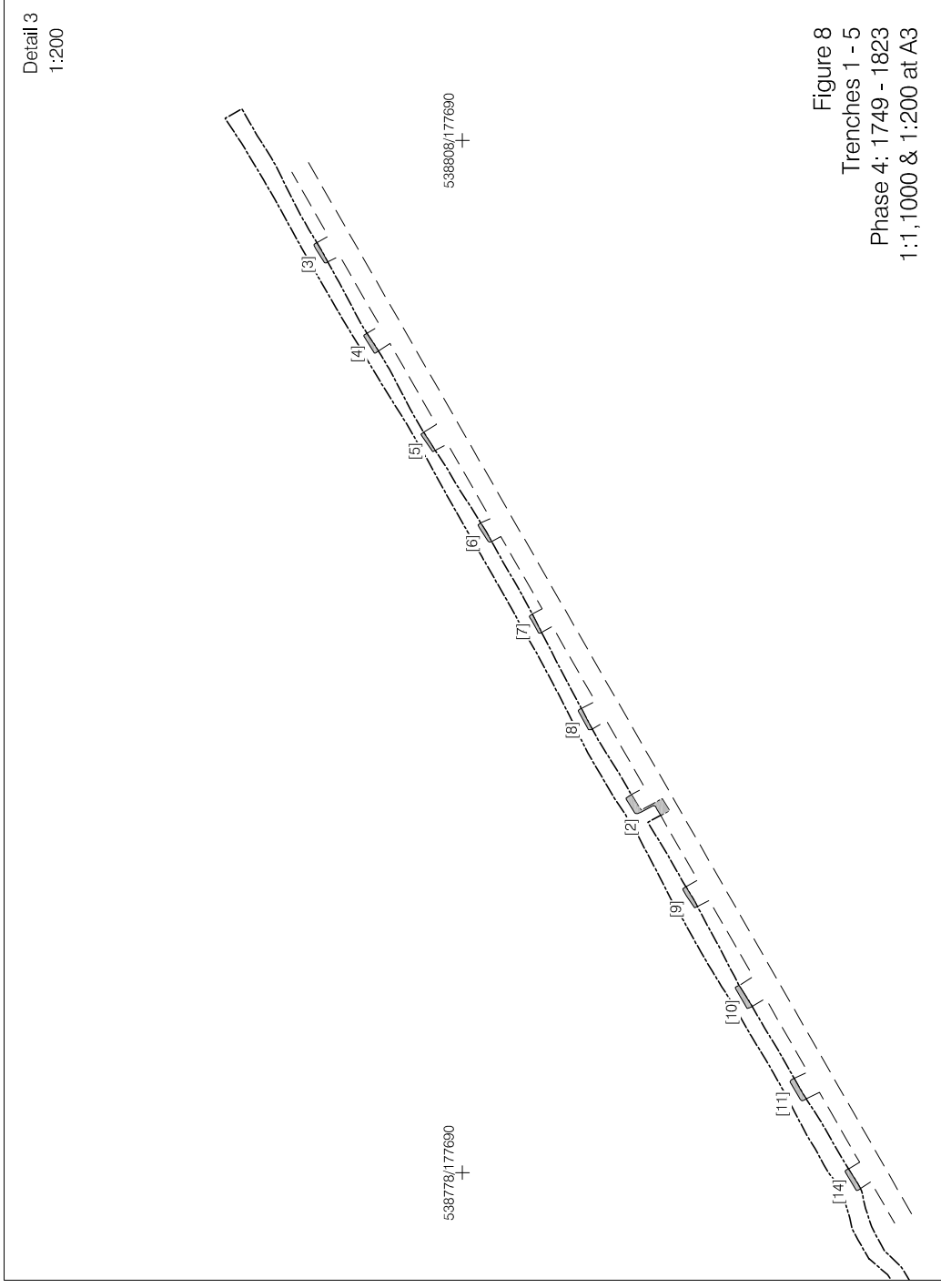
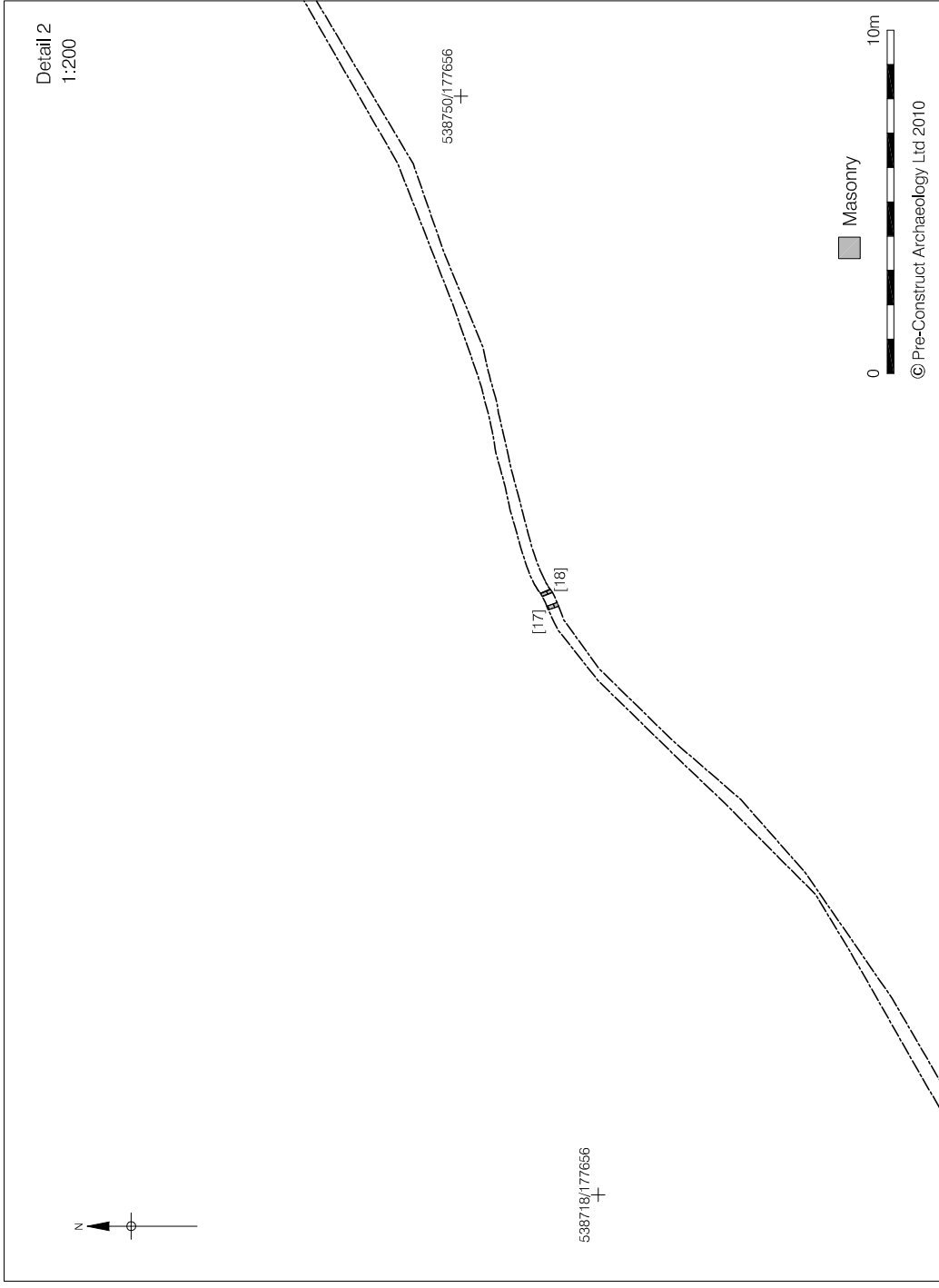
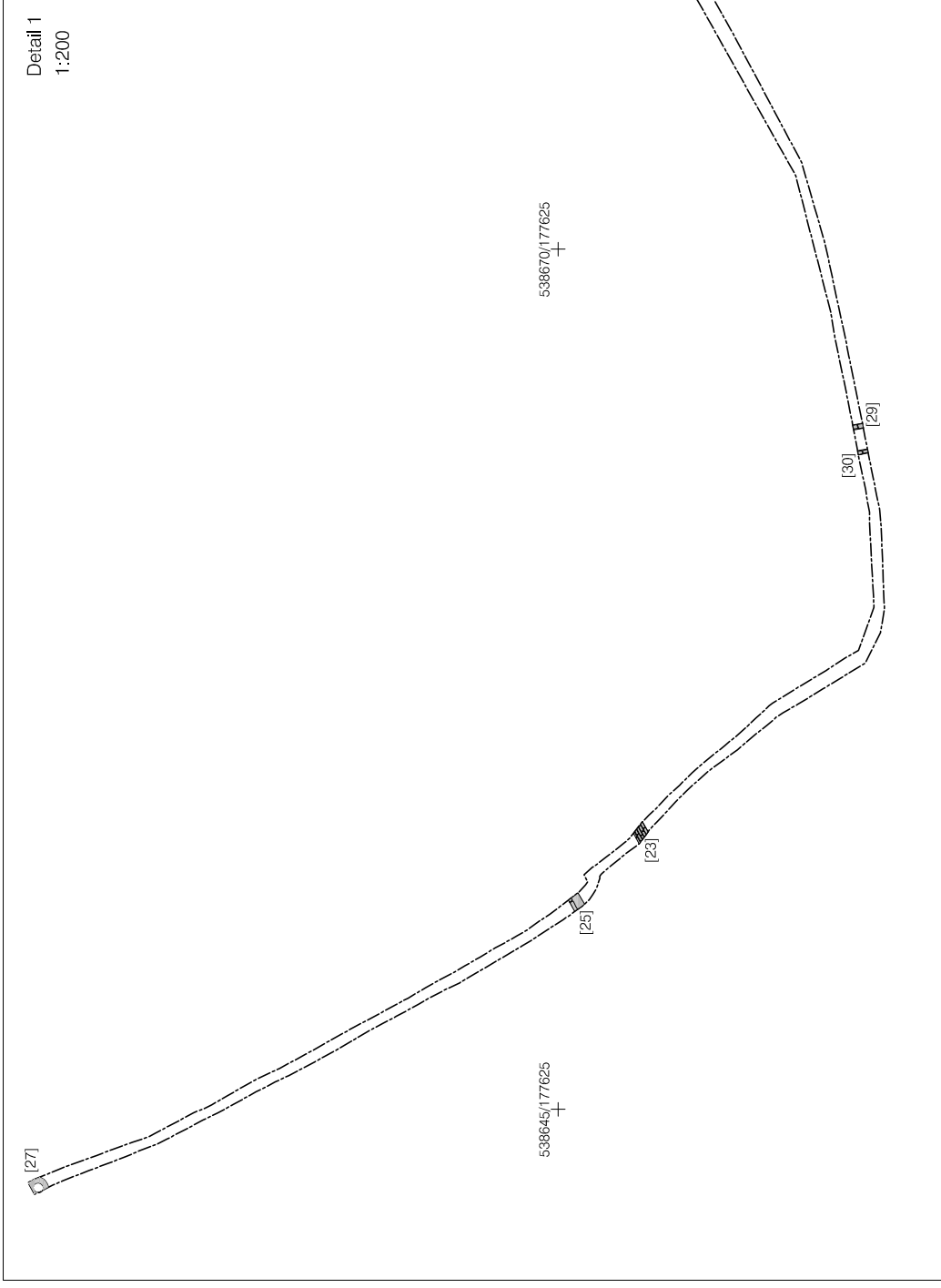
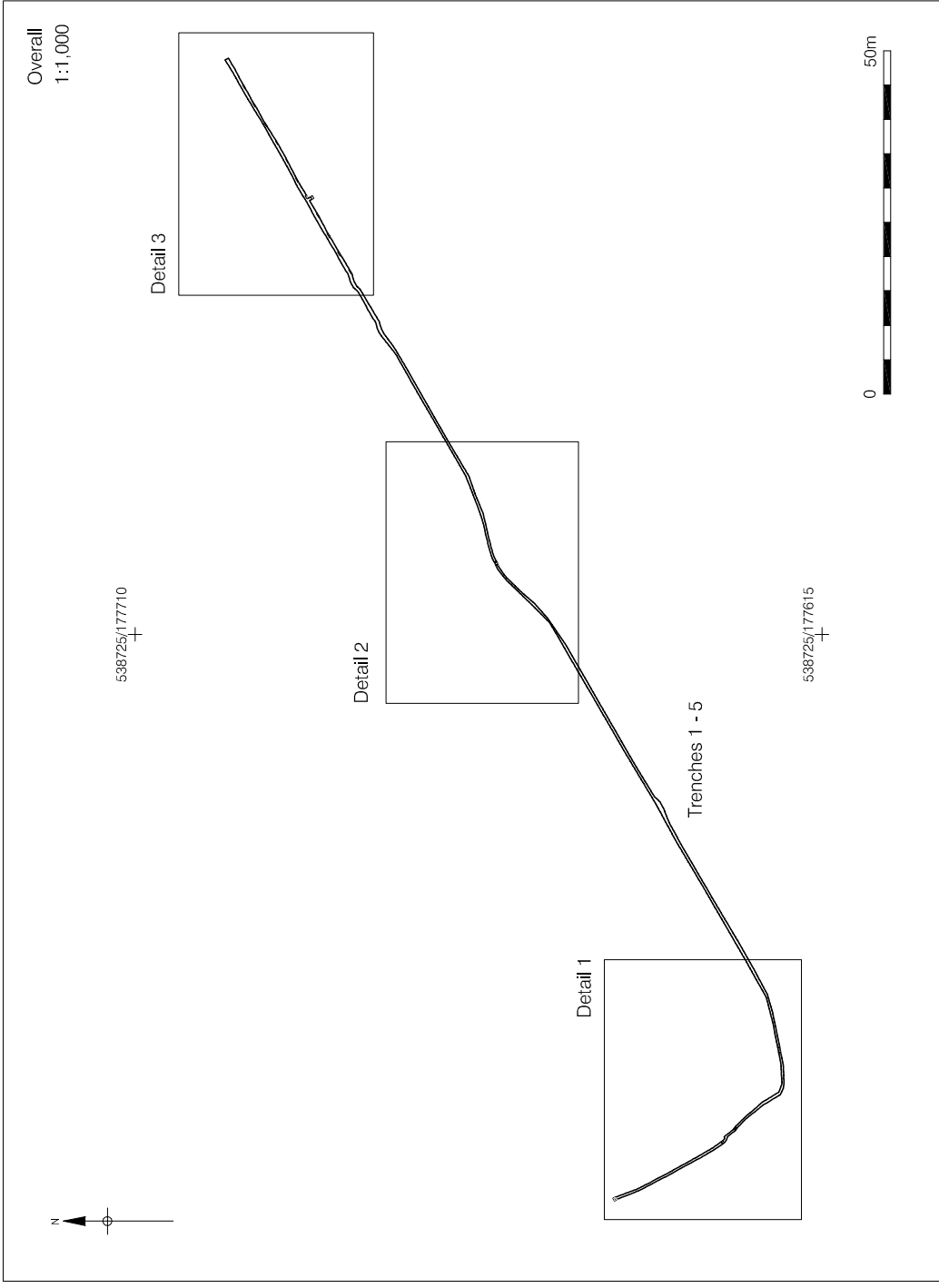


Figure 8
Trenches 1 - 5
Phase 4: 1749 - 1823
1:1,1000 & 1:200 at A3

7.5 PHASE 5: 1824-1936

Phase 5A: 1824 St Mary's Church (Fig. 9)

- 7.5.1 In Trenches 6-12 to the west of the site the foundations of several brick walls were recorded. In Trench 10 a northwest-southeast aligned 0.60m wide wall constructed from red brick was observed. In Trenches 9 and 11 red brick masonry, [52] & [56], was observed over a distance of c. 29m. The wall was up to 0.50m wide and appeared to have a series of gaps within it which were defined on their southern side by protruding pieces of masonry. The gaps may represent small lightwells into the crypt. To the west in Trenches 6 and 7 two further elements of walling [47] and [50] were revealed, the latter on a northwest-southeast alignment. In Trench 12 a curved wall c. 0.30m wide [63] and a small fragment of wall [60] were observed. The monitoring of a pipe trench across the Church revealed further masonry.
- 7.5.2 From documentary and cartographic evidence it is evident that they relate to St Mary's Church which was constructed in 1824 and demolished in 1936. The location of the walls suggest that they formed the western portico, [47], the western wall of the church, [50], the southern wall, [52] and [56], the eastern wall, [54] and a stretch of the boundary wall, [60] and [63]. The masonry revealed during the monitoring of the pipe trench represents part of the eastern wall, [303], of the church and an internal wall [304].
- 7.5.3 Within the crypt of the church the tops of nine lead coffins were exposed in the base of the pipe trench. The coffins were laid north-south and appeared to be grouped in rows of three. One group was exposed towards the eastern end of the church. The central one of the three had an inscription on its lid which read:

Frances Elizabeth Robertson

Born XVI August

1804

Died XXVIII February

1852

The two other groups of three lay in the central part of the church. The tops of the coffins were revealed at 8.74m OD to the east and between 8.51m and 8.56m OD to the west.

Phase 5B: 1833 Swimming Pool (Fig. 10, Plate 3)

7.5.4 This phase is represented by a series of postholes [182], [199], [201], [203], working surface [114] and a series of dump layers; [123], consisting of fragments of cbm and mortar, possibly demolition material acquired from previous structures on the site during the levelling of the area, [121], [122], [135], [178], which were compact silty sands. A cast iron pipe, [179], was laid down and then layers [122] and [135] were built up around it. This is probably indicative of the initial construction phase of the pool shown on maps to have been on the site from 1833, with the postholes representing scaffolding and other support works.

7.5.5 This area of consolidated ground was then cut into by the construction cut [81] into which was poured a large concrete slab, [133]. It measured 42.38m in length, with a width of 20.38m and had a thickness of 0.14m. The majority of the concrete slab had a preserved depth of 0.24m, though at the eastern end there was a sunken deeper area that was rectangular in plan, measuring 6.75m north-south by 3.63m east-west and with a depth of 0.81m. This concrete formed the base of the swimming pool.

Phase 5C: 1839 Re-lining of Swimming Pool (Fig. 11)

7.5.6 A skim of concrete, [78], was laid on the existing floor of the swimming pool and a brick lining, [83], was added. The yellow frogged bricks were laid on edge and bonded with hard cement. This in turn had a concrete render, [82], laid over it. These works were part of the documented re-lining and waterproofing of the pool which took place in 1839.

7.5.7 In the centre of the floor was a large raised area of gravels, [112], onto which concrete skim [78] lipped up. This area followed the shape of the pool and had a length of 31.50m and a width of 10.13m. This area has been interpreted as an 'island' within the centre of the pool which is shown on the late 19th century Ordnance Survey maps of the site (Fig. 14). This may have been constructed during the 1875 re-build, but it has been tentatively ascribed to the 1839 phase as the known re-lining of the pool base of 1875 appears to post date it.

Phase 5D: 1875 Further Modification to the Pool (Fig. 12, Plates 4-7)

7.5.8 This phase saw the construction of a large sub oval wall, [101] and the erection of thirteen cast iron columns, [84] – [96], in a horseshoe shape in the centre of the site and a sunken room in the south-east of the site and probably relates to the re-building of the pool structure in 1875.

7.5.9 The sub-oval wall [101] was constructed from lightly frogged yellow bricks measuring 230mm by 100mm by 65mm with a width of 0.47m on the top, corbelling out in three tiers at the base to a width of 0.80m and an overall circumference of 23.75m north-south and 51.63m east-west.

7.5.10 A probable entrance was constructed at the eastern end of the sub-oval wall, comprising of brickwork [106], [107], [108] and [109]. These were constructed from frogged bricks measuring 220mm by 105mm by 60mm.

Context No	Length	Width
106	3.80m	1.42m
107	1.90m	0.48m
108	1.40m	1.16m
109	1.48m	1.05m

7.5.11 The iron column bases took the form of 'I' beams and measured 0.29m by 0.29m. They were set into concrete plinths at which level they had been broken off. The bases were placed in two parallel rows of six columns each set 8.50m apart and were 6.25m away from the next column in the row. A thirteenth column was placed in the centre at the western end, completing the horseshoe shape.

7.5.12 A sunken room was built onto the south-eastern corner of the sub-oval wall [101] and exhibited signs of re-building itself. Initially the room was probably not sunken and was constructed from brick walls [102] and [103], which formed a sub-square room 5.10m north-south by 8.00m east-west, with a threshold to the north-east, leading through wall [101]. Part of the original floor bedding layer, [177] was still evident, butting up against the wall [103] at a level of 10.04m OD. This was constructed from loosely bonded concrete and pebbles and survived to an area of 0.40m NE-SW by 0.62m NW-SE and had a thickness of 0.08m. The surface of [177] retained the impression of bricks lain for the floor surface. The impressions gave a dimension of the bricks as being 225mm by 108mm.

7.5.13 Brickwork [105] (Fig. 13) was built onto the eastern end of wall [101], extending into the room formed by walls [102] and [103]. It measured 0.46m east-west by 0.34m north south and had a height of 0.46m. The function of this brickwork is uncertain though it may be to do with tidying up a break in wall [101] during the widening of the sub-square room northwards in a phase prior to further work which deepened the room.

- 7.5.14 The room was deepened by 0.90m with underpinning to wall [103] by wall [117] evident. A course of slate was inserted between the two phases of wall which was then rendered over with hard concrete. At the same time north-south wall [69] was inserted under [105], with obvious patching in the brickwork around the join. East-west wall [67] and north-south wall, with inbuilt lightwell [68] were also constructed at this time, with stairs [79] abutting onto them.
- 7.5.15 At the western end of wall [67] was an in built recess for cast iron pipe [74] which ran north before turning west and into the area of the pool.
- 7.5.16 In the south-west corner of the room a small rectangular brick flue, [70], was butted up against walls [69] and [117]. It measured 0.94m east-west by 0.35m north-south and had a surviving height of 1.20m, with internal dimensions of 0.50m by 0.25m. The front of the flue showed evidence for a hinged cast-iron gate (which was found *ex situ* in demolition layer [99]). The gate was probably used to regulate airflow to a furnace which has since been demolished.
- 7.5.17 A concrete floor, [73], was laid, lapping slightly against the walls and flue. It sloped downwards from the east to the west, initially with a steep drop of 0.30m from the base of stairs [79], over a distance of 1.06m. It then had a gradual fall towards wall [69] where there was a gully that ran northwards, turning eastwards along wall [67] to a grate and a drain that ran back south under the room and off the site. Within the surface of the floor were the shadows of two rectangular machine bases measuring 0.90m north-south by 1.04m east-west. The purpose of the machine is uncertain, though they probably had something to do with pumping and/or heating the water for the pool.
- 7.5.18 Butted onto the southeastern corner of the room was another smaller square room. This was formed by wall [71], and York Stone floor [72]. The room measured 2.80m east-west and had a depth of 1.46m. The southern elevation of wall [71] showed traces of an arched roof, indicating that this room was subterranean. The function of the room is unclear, though it could well have been used as a fuel store.
- 7.5.17 During this time the threshold through wall [101] was also sealed up with brickwork, [76], suggesting that a new entrance into this area was created directly from outside, rather than through the poolhouse.
- 7.5.18 A rebuild of the boundary wall [2] was recorded in Trench 1. The rebuild, [1], remains as the existing boundary dividing The Queen's House and Royal Naval Hospital

buildings from Greenwich Park and sits directly on top of the previous wall. The bricks measured 220mm by 110mm by 60mm and were laid in Flemish Bond, with thirteen courses above ground level and one stretcher course below ground level. The bottom two courses above ground level were rendered and the wall was capped with a stone cornice.

7.6 PHASE 6: POST 1936

- 7.6.1 During this phase large dumped deposits with frequent fragments of cbm and mortar were prevalent across the site, [28], [39] = [40], [41] = [42] = [43] = [44] = [45], [99] = [140]. These have been interpreted as the demolition of the swimming pool and St Mary's Church, which is documented to have taken place in 1936.
- 7.6.2 To the west of the main area of archaeological investigation two pits (Charnel Pit A & B) and a sewer pipe were monitored. All three contained disarticulated human bone. Charnel Pit A measured 1m by 1m and was 1.2m deep. It contained the disarticulated bones of at least seven adults. Charnel Pit B measured 2m by 2m and was 0.8m deep. Only the eastern edge of the pit was disturbed with three adults skulls being observed, the rest of the pit was preserved *in situ*. Both pits were cut through the levelling layers that were deposited after 1936 and were sealed by topsoil. They most likely represent the remains of skeletons which have been disturbed during intrusive works within the site of Mariners' Cemetery and then placed within pits. Disarticulated human bone was also observed within the backfill of a sewer trench, which represents the remains of skeletons disturbed during the construction of the sewer.
- 7.6.3 Drain [97] = [109] was cut through the eastern end of the poolhouse foundations, entering the site from the eastern limit of excavation it headed westwards to tie into pipe [129].
- 7.6.4 Levelling layers [35] = [36] = [37] = [38], [141] and [142] which sealed all of these deposits together with topsoil [34] = [58] = [143] = [188] represent the subsequent landscaping of the area into gardens.

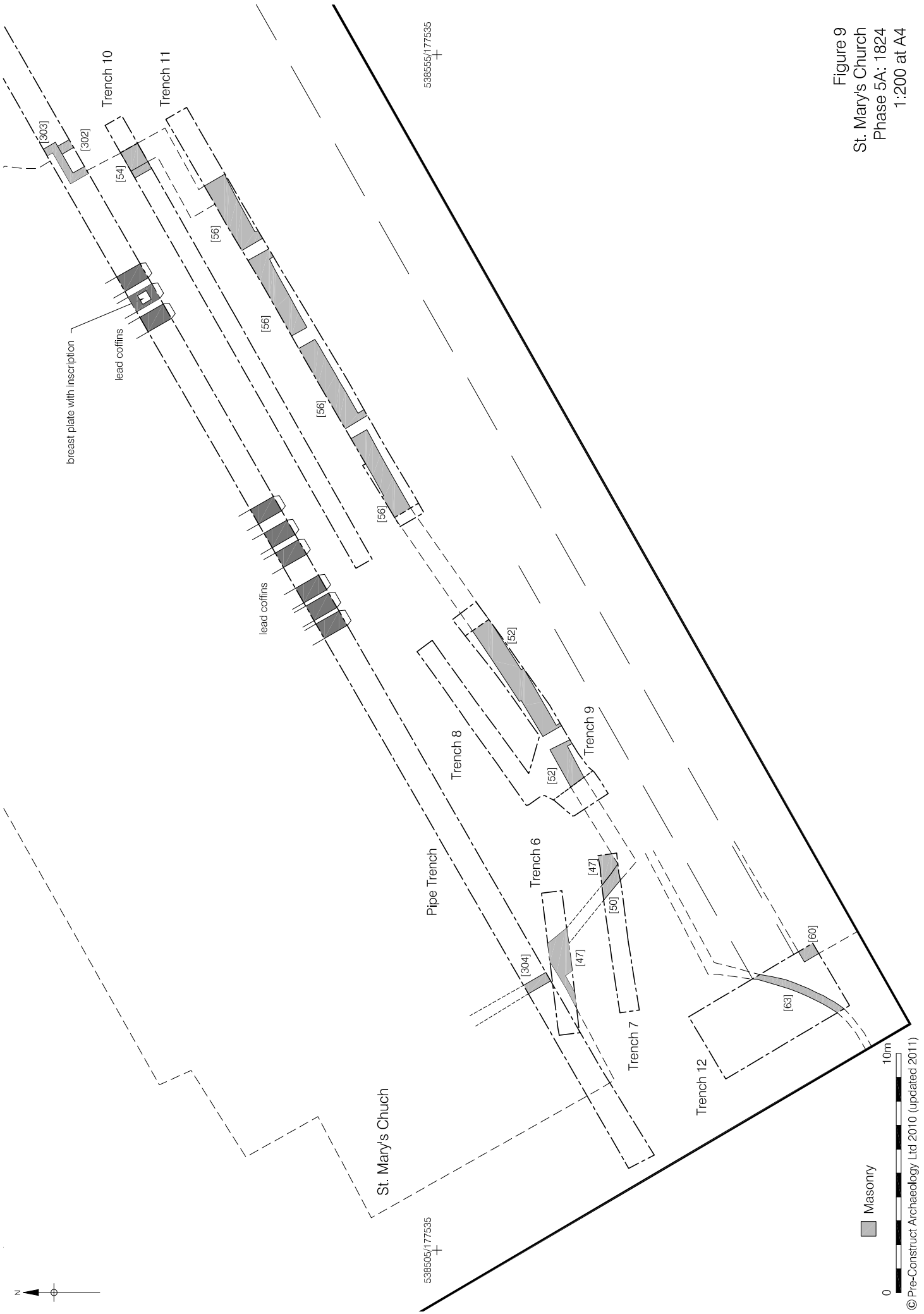
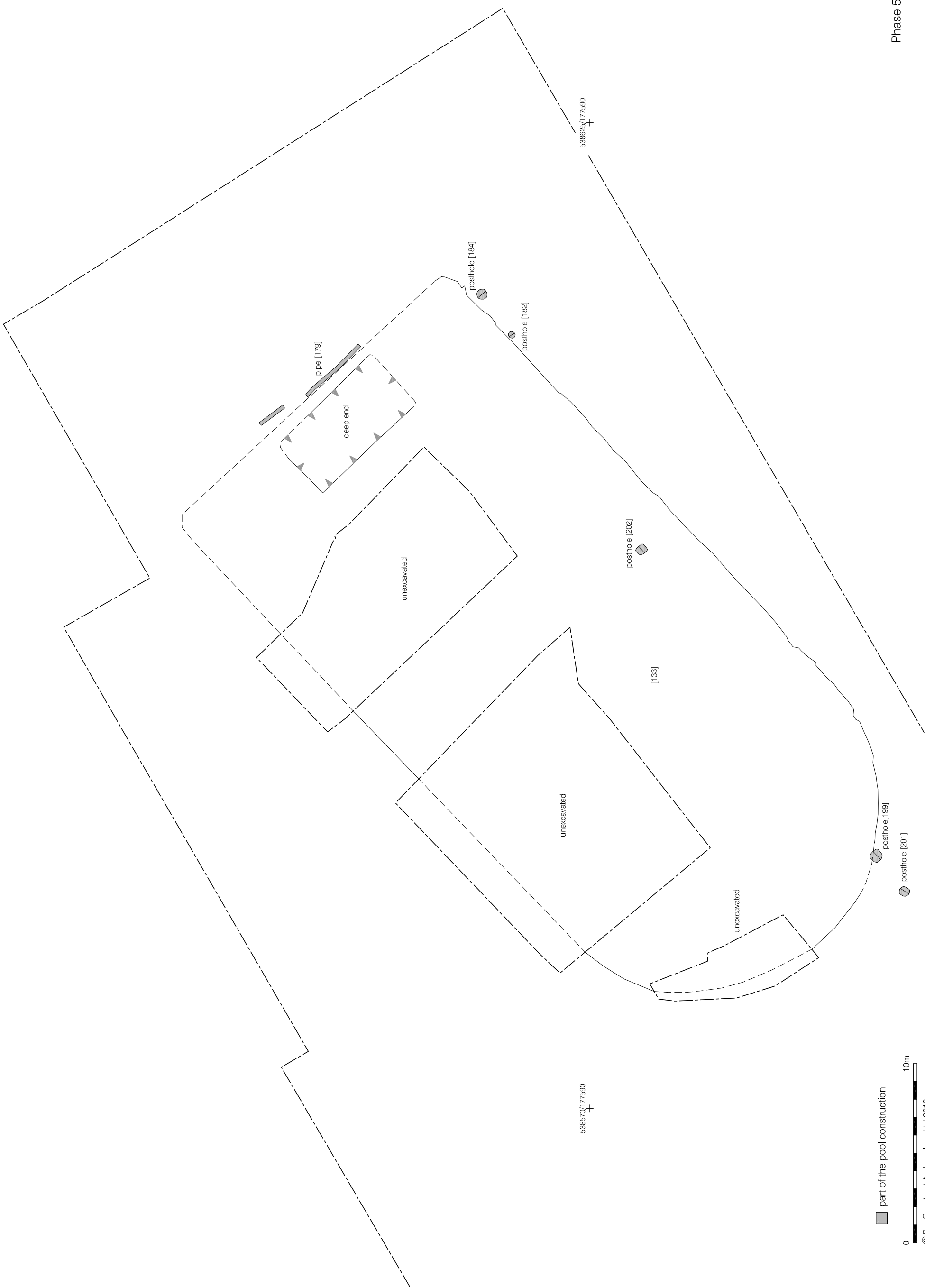


Figure 9
 St. Mary's Church
 Phase 5A: 1824
 1:200 at A4

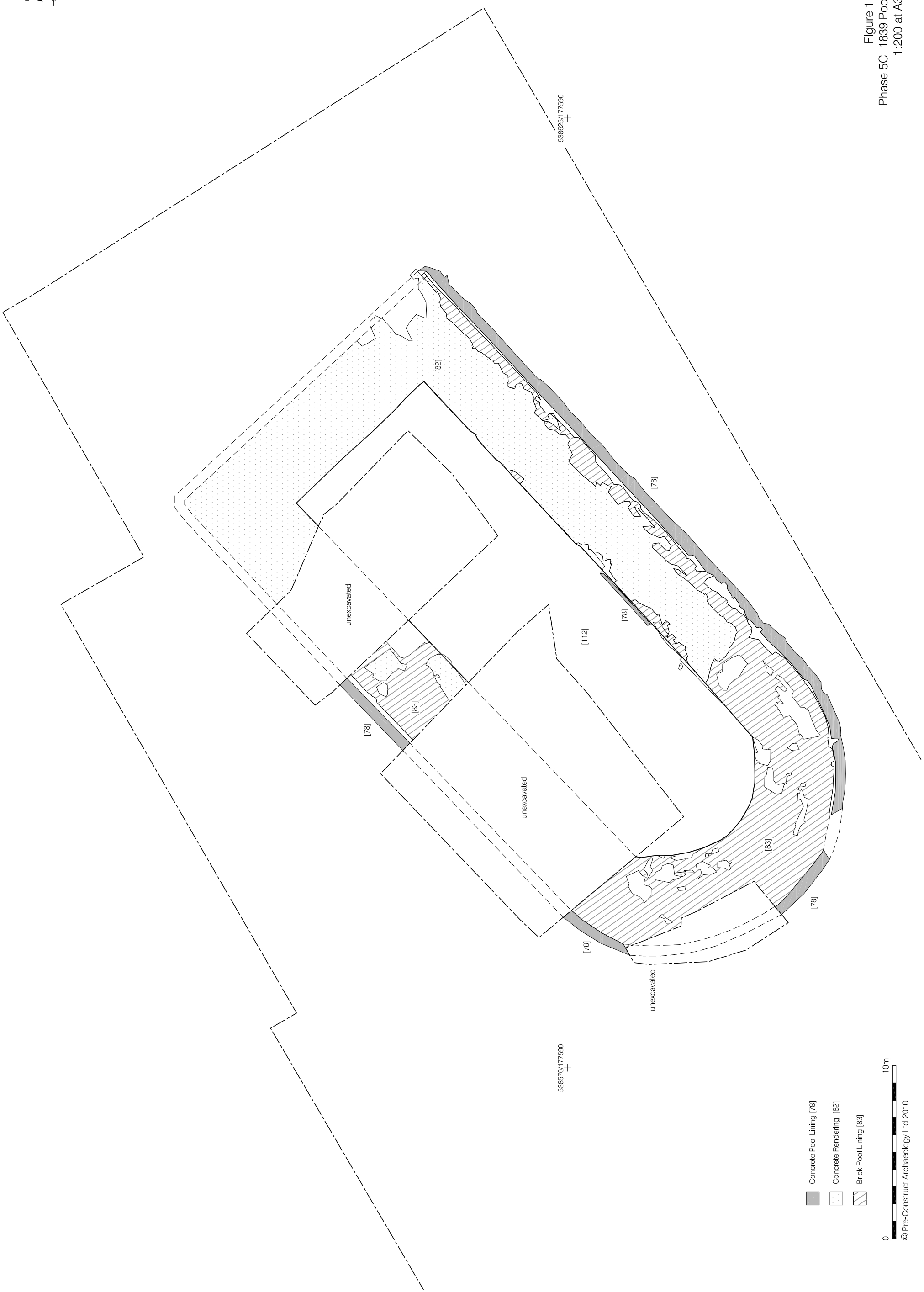


part of the pool construction



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Figure 10
Phase 5B: 1833 Pool
1:200 at A3



- Concrete Pool Lining [78]
- Concrete Rendering [82]
- Brick Pool Lining [83]



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Figure 11
Phase 5C: 1839 Pool
1:200 at A3

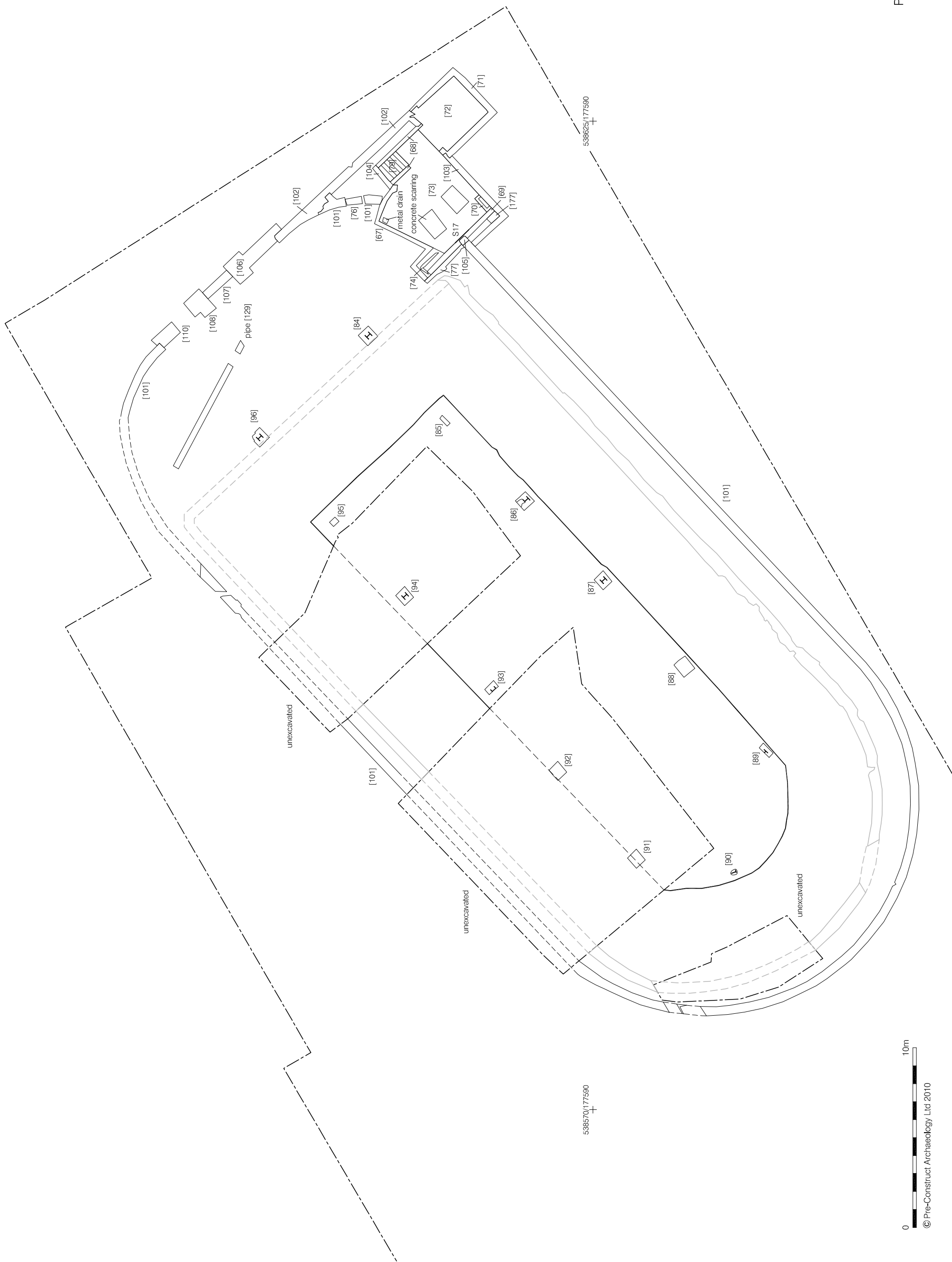
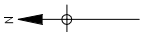
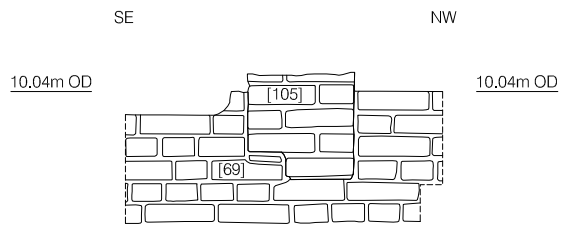
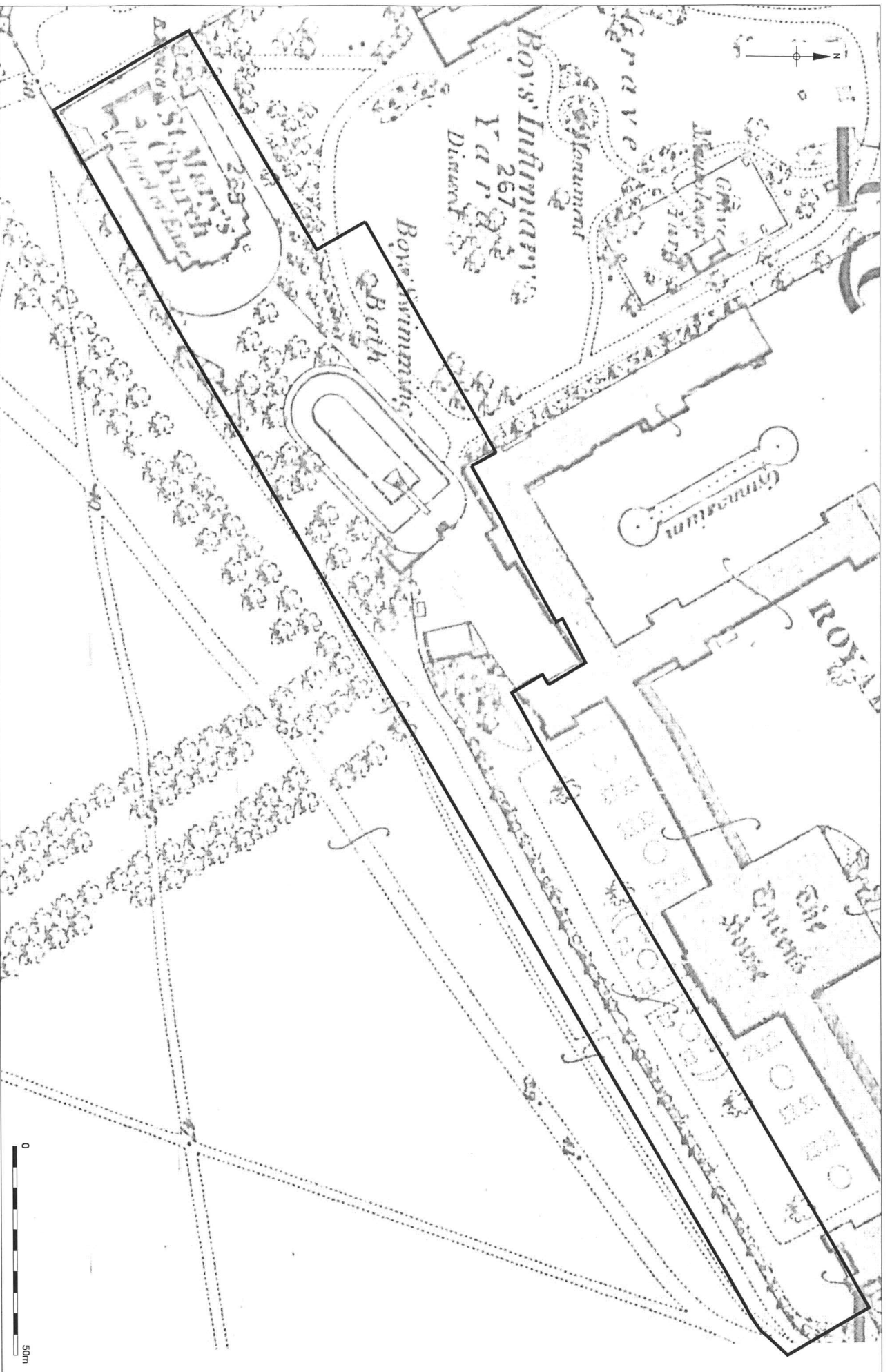


Figure 12
Phase 5D: 1875 Pool
1:200 at A3



Section 17
Swimming Pool
Northeast Facing

0 1m
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Figure 14
Ordnance Survey 1st Edition map, 1870
1:1,250 at A4



PLATE 1: SECTION ACROSS ROAD [239], LOOKING EAST



PLATE 2: LATE 18TH-EARLY 19TH CENTURY CELLAR, STRUCTURE [211], LOOKING NORTH



PLATE 3: OVERVIEW OF THE SOUTHERN PART OF THE POOL, LOOKING WEST



PLATE 4: MACHINE PADS WITHIN PUMP ROOM OF POOL-HOUSE, LOOKING SOUTH-WEST



PLATE 5: DETAILED OF VAULTING OF SUBTERRANEAN ROOM ADJACENT TO PUMP ROOM, LOOKING SOUTH



PLATE 6: THE DEEP END OF THE ORIGINAL 1833 POOL, BACKFILLED AND CAPPED WITH BRICKWORK AND RENDER IN 1839, LOOKING SOUTH



PLATE 7: THE POOL BASE WITH THE NORTHERN WALL (JUST UNDER THE FENCING IN THE BACKGROUND). NOTICE TO THE LEFT THE AREA OF THE ISLAND AND THE BASE OF THE BRIDGE, LOOKING NORTH



PLATE 8: Lead Coffins within Pipe Trench, Coffin with name plate in foreground



PLATE 9: Coffin name plate

8 DISCUSSION

8.1 Phase 1: Natural

8.1.1 The natural deposits consisted of sandy gravels concurrent with the Shepperton, gravels that were deposited at the end of the last glaciation. They were recorded at a maximum height of 9.79m OD and a minimum height of 8.53m OD and were seen to be more than six metres thick across the site.

8.2 Phase 2: Medieval

8.2.1 Only a small amount of activity occurred during the medieval period, comprising of pits, [206] and [226] and ditch [207]/[209]. It is probable that the ditch represents a field boundary and the activity here is one of small scale farming on the periphery of medieval Greenwich.

8.3 Phase 3: 16th Century

8.3.1 The road that represents this phase is probably a section of the main Deptford – Woolwich highway that existed from at least Tudor times. Cartographic evidence suggests that it lay within the northern part of the site, although as observed it would appear to be located further to the south than once predicted (Bowsher & Rodenbuesch 2008). It is apparent that it has suffered from severe truncation, not only by later buildings but also horizontally, probably through later construction activities. It is evident that the road was subject to continual resurfacing over time.

8.4 Phase 4: 1749 – 1823

8.4.1 The inhumations that represent Phase 4 are part of the Mariners' Cemetery linked to the Royal Hospital Greenwich. Maps place the area of the site where the bodies were recorded as being the south-eastern corner of the cemetery. It would seem that the Deptford – Woolwich road demarcated the southern extent of these burials as they seemed to respect the thoroughfare and no bodies were found cutting through the centre of the road. Skeletons that were revealed to the west in Bosun's Yard in 1990 and in 1991 probably still lay to the north of the road.

8.4.2 The 17 skeletons have the potential to add to our knowledge of the cemetery's naval population previously reported upon by Oxford Archaeology (Boston et al 2008). The coffins and coffin furnishings discovered within the graves were very simple in design.

It appears that they were constructed from single thickness wooden planks, with all the furnishings made from iron, the cheapest material available.

8.4.3 The small brick-built subterranean structure assigned to this phase is probably a cellar, possibly for cold storage, associated with hospital buildings. The stone bases set on the base of the cellar were probably for a suspended floor, the possibility of them being machine bases being ruled out due to the lack of room for raking out etc and the non-existence of any signs of heating of the area or burnt material within the structure at all. There is no obvious structure on any of the historic plans, however it is possible that it represents a small building in the grounds of Greenwich Hospital depicted in a view of 1804 taken from the Camera Obscura in the Royal Observatory.

8.4.4 It is possible that the cellar replaced an earlier structure on the same plot as the remains of earlier brickwork on a different alignment were observed. It is possible that these may have been part of a boundary or garden wall.

8.5.5 The wall that runs along the park boundary to the east of the site and curved in across the eastern sector of the site was probably the boundary wall that divided the Hospital and Queen's House from the park. An early version of this is seen on the same drawing of 1804 published by Richard Phillips.

8.5 Phase 5: 1824 - 1875

8.5.1 The walls revealed within the western end of the site, tie in with cartographic and photographic evidence that locates St Mary's Church in the present day King William Garden. The lead coffins which were revealed within the crypt accords with documentary research which suggests that c.350 burials remained in the crypt following the demolition of the church in 1936.

8.5.2 The central area of the site was occupied by the swimming pool built in 1833. It was originally constructed for the rehabilitation of sailors who were in residence at the hospital, but later it was also used by the orphanage. The structure showed evidence of redesign and rebuilding throughout its duration, much of which can be tied into documented evidence; the re-lining of the pool in 1839 and the roofing of the structure in 1875. The dating of some of the re-builds still needs refining, especially within the sunken room in the south-eastern corner. It is probable that the sunken room was a boiler/pump room used for heating water for the pool in its later phase.

8.5.3 The raised area within the centre of the pool was probably an island that was used for the rehabilitation of the sailors who had difficulty walking. It is documented that a man stood on the outside of the pool and a man stood on the island with a rope between them. The sailors would then hold onto the rope and walk around the pool with the weight of their bodies lessened by the water (M. Stevenson pers. comm.). The island is shown on the 1870 Ordnance Survey Map (Fig. 14) and a drainage plan of the Royal Hospital Schools of 1884.

8.6 Phase 6: Post 1936

8.6.1 The large deposits of rubble seen across the site during this phase were probably the result of the demolition of the pool and St Mary's Church in 1936.

9 ORIGINAL RESEARCH QUESTIONS AND REVISED RESEARCH QUESTIONS

ORIGINAL RESEARCH QUESTIONS

9.1 The general aims and objectives of the archaeological investigation were laid out in the Written Scheme of Investigation (Bradley 2009a). These were as follows:

- Insofar as possible within the methodological constraints, the aims and objectives will be to explain any chronological, spatial or functional relationships between the structures/remains identified, and to link the archaeological results with the historic data already collated in the historic study undertaken by MoLAS (Bowsher & Rodenbuesch 2008).
- A major aim is to gain more detailed information on the nature and survival of archaeological deposits and any changes that may not be reflected in the cartographic and historic sources. It is hoped that this will add to our knowledge of the evolution of the site and its subsequent use.

9.2 More specific research questions were posed in the MoLAS Evaluation report (Bowsher 2008) and these were still relevant to the present investigation.

9.3 What is the nature of and level of natural topography?

9.3.1 The natural river terrace gravels (Shepperton Gravels) had a level of c. 9.79m on the southern edge of the site, falling off to c. 8.53m to the north towards the Thames. On the higher land, to the south of the site, the gravels were sandier, getting richer in clay content towards the northern periphery of the site.

9.4 What are the earliest archaeological deposits identified?

9.2.1 The earliest archaeological deposits identified were pits and ditches relating to the medieval period. These were all located within the northeast part of the site and possibly reflect small scale farming on the edges of medieval Greenwich.

9.5 What evidence is there for the construction and use of the Deptford – Woolwich road?

9.5.1 A section of the Deptford – Woolwich road was uncovered running on an east-west alignment along the northern bounds of the site for a distance of 23.80m. It had suffered from horizontal truncation and thus lost the upper and latest layers but was still extant to a maximum thickness of 0.93m and had a width of 4.56m. It was constructed from layers of compacted sandy gravels containing high amounts of clinker and sandy silts. Rutting, from cart wheels, and subsequent repairs were evident along its length with back filled ruts in the latest surface containing bricks, dated to between 1450 and 1700.

9.6 What is the evidence for post-medieval exploitation of the site prior to the establishment of the Greenwich Hospital Burial Ground in the 1740s?

9.6.1 Apart from the road there is no evidence of post-medieval exploitation of the site pre-dating the 18th century. A boundary wall, cellar and an earlier truncated structure were revealed which related to the time that the burial grounds would have still been in use.

9.7 Were there burials associated with the Burial Ground present on site?

9.7.1 In total 17 inhumation burials located within 7 grave cuts and a charnel pit filled with disarticulated human bone were uncovered to the north of the site, bounded by the Deptford – Woolwich road to the south. It is probable that this reflects the southeastern corner of the Greenwich Hospital Burial Ground.

9.8 What is the extent of, and degree of truncation caused by the 1833 swimming pool and subsequent development of the site?

9.8.1 Even though the pool was mainly an above ground structure truncation had taken place down to the natural gravels across the majority of the site, apart from to the east in the pool entrance and the north where the naturally sloping topography protected the underlying archaeology to an extent.

9.8.2 Although the pool did not cover the area of the Deptford – Woolwich road or the cemetery, horizontal truncation had taken place, this is probably due in the main to later landscaping of the area, though some could be the result of levelling the area prior to construction of the pool and south-west wing of the school buildings.

9.9 What were the latest deposits identified?

- 9.9.1 The latest deposits encountered on the site were associated with the demolition of the pool and St Mary's Church in 1936 and subsequent landscaping of the area.

REVISED RESEARCH QUESTIONS

Questions arising out of the excavation are as follows:

- How do the medieval features relate to the known archaeology of medieval Greenwich?
- What can analysis of the burials contribute to our knowledge of those buried within the Mariners' Graveyard?
- Is there any cartographic/documentary/pictorial evidence which can determine the function of the post-medieval cellar [211] and earlier truncated structure?
- Can the phasing of the rebuilding of the pool be better refined with the use of documentary evidence?

10 IMPORTANCE OF THE RESULTS, FURTHER WORK AND PUBLICATION PROPOSAL

10.1 Importance of the Results

10.1.1 The archaeological investigation revealed a small number of medieval features. Finds from the pits and ditch were sparse and these remains are only of local significance.

10.1.2 The discovery of the route of the Deptford – Woolwich roadway is of local significance. Previous suggestions of its location based on cartographic evidence suggested it lay further to the north (Bowsher & Rodenbuesch 2008). It has been possible during the present investigation to pinpoint its location and provide evidence of its dimensions and construction.

10.1.3 Seventeen burials, contained within 7 graves, and a quantity of disarticulated human bone within a charnel pit were revealed to the north of the south. The inhumations form part of the Mariners' Cemetery attached to the Royal Hospital Greenwich. Previously a total of 107 skeletons had been recovered from the same cemetery between 1999 and 2001 (Boston et al 2008). These skeletons are of national importance as they are from one of the few naval cemeteries to be excavated and have allowed a unique opportunity to study sailors' remains and help to provide information regarding their lifestyles, diet and diseases. The new assemblage of 17 skeletons have been shown to have a number of interesting pathologies (see Appendix 8) and will make a significant contribution to the study of the cemetery population.

10.1.4 The investigation has helped to locate the remains of St. Mary's Church, built in 1824 and demolished in 1936. It has been confirmed that burials within lead coffins survive within the backfilled crypt. The coffins were not uncovered completely and were not recorded in detail but one of the 355 that could be identified in 1936 (Clarke 1998) was still identifiable. These remains are of local significance.

10.1.5 The remains of the swimming pool are of both local and national significance as they are part of the Royal Hospital and the size of the pool and its construction methods with its use of mass concrete were innovative at the time of its establishment in 1833. The modifications of the pool over the course of the 19th century have been revealed in the archaeological record.

10.2 Further Work

10.2.1 Other medieval finds from the Greenwich area should be studied to place the medieval features in their context.

10.2.2 Further documentary and cartographic research will be conducted into the structures found within the investigation area especially the roadway, St Mary's Church and the swimming pool. The results from the previous excavation of the Mariners' Cemetery will be compared with the present findings.

10.2.3 The following finds assemblages contains a number of items of interest that require further research and comparison to be included at the publication stage.

Human Bone

10.2.4 The articulated remains should be fully analysed, to include full analysis of age, sex, metric data and pathologies and the subsequent report written to include the results of this analysis. The analysis should be done to the same standard as that of the previous report by Oxford Archaeology at the Royal Hospital Greenwich (Boston et al 2008) in order to provide a supplement to that site.

10.2.5 The fused left tibia and fibula of skeleton [248] require an x-ray to determine the whether there is an underlying fracture present which has caused the ossified haematoma. Some of the more notable pathologies within the assemblage should be photographed. This would include the potential pipe facets seen in skull [229], the ossified haematoma of skeleton [248] the gout and Pagets disease witnessed in disarticulated charnel material [236] and the DISH encountered on vertebrae within disturbed grave fill [294].

Coffin Fittings

10.2.6 The coffin fittings and other burial furniture should be included in any further publication of this portion of the Greenwich Royal Hospital cemetery, to conform with the previously published excavations. For the purpose of a full report of the findings, nine heavily concreted coffin grips from Graves [230], [233], [250] and [287] should be x-rayed to enable type identification. For the same purpose, the probable horseshoe from interment [291] in Grave [250] should also be x-rayed.

Other Metal Objects

10.2.7 The two metal finds from the medieval Phase 2 should be included in any further publication of the site. For this purpose, the iron strap fitting (sf 9) will require x-ray for

further identification. The substantial iron structural fitting (sf 10) will also need further identification, and relevant parallels need to be established.

Building Materials

10.2.8 This assemblage contains a number of items of interest that require further research and comparison to be included at the publication stage.

10.2.9 The concrete mouldings used to line the 1833 pool represent some of the earliest examples of waterproof mortar in the country. The fabric needs to be looked at and compared with other contemporary naval and merchant navy projects.

10.2.10 A study needs to be made into this waterproof concrete and mortar fabrics and forms used in these early-mid 19th century swimming baths and to line and demarcate Victorian beach areas such as those at Ilfracombe (Hayward pers. obs.). The manufacture of the mouldings and the process of adding plaster and paint need to be examined. A series of thin-sections of these early mortars and concretes should be undertaken to explore the differences in the manufacture of these innovative fabrics.

10.2.11 Further work needs to be undertaken on the use of materials by the navy from the Chatham area – yellow London stock bricks and different innovative concretes not only in London but at other dockyard sites e.g. Portsmouth and Plymouth.

10.2.12 The use of firebricks in the heating of these early swimming pools needs to be looked at. Whether one manufacturer was responsible for this exclusive part of the market

10.2.13 The examination of other naval cemeteries to see whether certain stone materials e.g. Portland limestone was in use for grave markers.

Other assemblages

10.2.14 No further work is required for the pottery, glass, clay tobacco pipe and animal bone assemblages.

10.3 Publication Proposal

10.3.1 It is proposed to publish the results as an article in a local or regional archaeological journal. It will be divided into two strands, one focusing on the cemetery whilst the other will examine the pool, and other features.

10.3.2 The publication will contain the following sections:

- Background to the Archaeological Investigation
- Historical Background of the study site
- The Archaeological Sequence
- The results of the full analysis of the skeletons
- The coffin furniture and objects recovered from the graves will be described
- The results of the full analysis of the pool house and other structures
- The report will be fully illustrated with AutoCAD figures, finds drawings and photographs

11 CONTENTS OF THE ARCHIVE

11.1 The Paper Archive

Context Sheets	298
Plans	46
Sections	14

11.2 The Finds Archive

Human Bone	18 Boxes
Pottery	1/2 Box
Animal Bone	1/2 Box
Clay Tobacco Pipe	3 Pieces
Building Material	2 Boxes
Coffin Furniture	2 Crates

11.3 Photographic Archive

Digital	122 shots
Black & White 35mm	195 shots
Colour Slide	196 shots
Black & White Medium Format	3 shots
Colour Medium Format	9 shots

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- 12.1 Pre-Construct Archaeology Limited would like to thank The National Maritime Museum for commissioning and funding the work, Reg Morris of Malcolm Reading Consultants for project management and Bovis Lend Lease and Mitchellson for their help on site, especially Tom Walker, Joe Nolan and Dan Hanrahan. The help and advice of Mark Stevenson, English Heritage GLAAS, is also acknowledged.
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APPENDIX 1: CONTEXT INDEX

Site Code	Context No.	Trench	Plan	Section / Elevation	Type	Description	Phase
NMI 09	1	1		1	Masonry	E-W Wall, (Re-build of [2])	5D
NMI 09	2	1	1	1+2	Masonry	E-W Wall & Buttress	4
NMI 09	3	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	4	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	5	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	6	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	7	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	8	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	9	1	Tr1 Bil2		Masonry	Buttress, (Part of [2])	4
NMI 09	10	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	11	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	12	1	1	2	Fill	Fill of [13]	4
NMI 09	13	1	1	2	Cut	Construction Cut for [2]	4
NMI 09	14	1	1		Masonry	Buttress, (Part of [2])	4
NMI 09	15	1	1	2	Layer	Natural Gravels	1
NMI 09	16	1	2	3	Fill	Fill of Drain [17] / [18]	4
NMI 09	17	1	2	3	Masonry	Drain	4
NMI 09	18	1	2	3	Masonry	Drain	4
NMI 09	19	1	2	3	Fill	Fill of [20]	4
NMI 09	20	1	2	3	Cut	Construction Cut for [17], [18]	4
NMI 09	21	1		3	Fill	Fill of [20]	4
NMI 09	22	1	3		Fill	Backfill of [24]	4
NMI 09	23	1	3		Masonry	Culvert	4
NMI 09	24	1	3		Cut	Construction Cut for [23]	4
NMI 09	25	1	4		Masonry	Wall Foundation	4

NMI 09	26	1	4		Fill	Rubble Infilling [27]	4
NMI 09	27	1	4		Masonry	Drain	4
NMI 09	28	1	5	4+5	Layer	Rubble	6
NMI 09	29	1	5	5	Masonry	Drain	4
NMI 09	30	1	5	5	Masonry	Drain	4
NMI 09	31	1	5	5	Fill	Backfill of [33]	4
NMI 09	32	1	5	5	Fill	Backfill of [33]	4
NMI 09	33	1	5	5	Cut	Construction Cut for [29] / [30]	4
NMI 09	34	6-11		6-11	Layer	Topsoil	6
NMI 09	35	8	Tr8		Layer	Made Ground	6
NMI 09	36	9		8	Layer	Made Ground	6
NMI 09	37	10		9	Layer	Made Ground	6
NMI 09	38	11		10+11	Layer	Made Ground	6
NMI 09	39	10		9	Layer	Demolition layer	6
NMI 09	40	11		10+11	Layer	Demolition layer	6
NMI 09	41	6	Tr6		Layer	Demolition Backfill	6
NMI 09	42	7	Tr7		Layer	Demolition Backfill	6
NMI 09	43	8-9	Tr8+9		Layer	Demolition Backfill	6
NMI 09	44	10	Tr10		Layer	Demolition Backfill	6
NMI 09	45	11	Tr11		Layer	Demolition Backfill	6
NMI 09	46	6			Fill	Backfill of [48]	5A
NMI 09	47	6	Tr6		Masonry	Church Wall	5A
NMI 09	48	7			Fill	Backfill of [49]	5A
NMI 09	49	7			Cut	Construction Cut for [48]	5A
NMI 09	50	7	Tr7		Masonry	Church Wall	5A
NMI 09	51	7	Tr7		Layer	Horticultural Soil	4
NMI 09	52	9	Tr9		Masonry	Church Wall	5A
NMI 09	53	9	Tr9		Layer	Horticultural Soil	4
NMI 09	54	10	Tr10		Masonry	Church Wall	5A
NMI 09	55	10	Tr10		Layer	Horticultural Soil	4
NMI 09	56	11	Tr11		Masonry	Church Wall	5A

NMI 09	57	11	Tr11		Layer	Horticultural Soil	4
NMI 09	58	12			Layer	Topsoil	6
NMI 09	59	12	Tr12		Fill	Backfill of [61]	5A
NMI 09	60	12	Tr12		Masonry	Church Wall	5A
NMI 09	61	12	Tr12		Cut	Construction Cut for [60]	5A
NMI 09	62	12	Tr12		Fill	Backfill of [64]	5A
NMI 09	63	12	Tr12		Masonry	Church Wall	5A
NMI 09	64	12	Tr12		Cut	Construction Cut for [63]	5A
NMI 09	65	12			Layer	Horticultural Soil	4
NMI 09	66	12	Tr12		Layer	Natural Gravels	1
NMI 09	67	Swimming Pool	Survey	*	Masonry	Curving Internal Wall	5D
NMI 09	68	Swimming Pool	Survey	*	Masonry	Staircase	5D
NMI 09	69	Swimming Pool	Survey	17	Masonry	NW-SE Wall	5D
NMI 09	70	Swimming Pool	Survey	*	Masonry	Chimney	5D
NMI 09	71	Swimming Pool	Survey	*	Masonry	Boiler Room, External Wall	5D
NMI 09	72	Swimming Pool	Survey	*	Surface	Flagstone Floor	5D
NMI 09	73	Swimming Pool	Survey	*	Surface	Concrete Floor	5D
NMI 09	74	Swimming Pool	Survey	*	Pipe	Cast Iron Pipe	5D
NMI 09	75	Swimming Pool	Survey	18	Layer	Backfill	5D
NMI 09	76	Swimming Pool	Survey	*	Masonry	Re-Build Door Blocking	5D
NMI 09	77	Swimming Pool	Survey	*	Layer	Concrete Levelling	5D
NMI 09	78	Swimming Pool	Survey	*	Layer	Concrete Pool Lining	5C
NMI 09	79	Swimming Pool	Survey	*	Masonry	Steps	5D
NMI 09	80	Swimming Pool	Survey	18	Masonry	Boundary Wall	4
NMI 09	81	Swimming Pool	Survey	12	Cut	Pool Construction Cut	5B
NMI 09	82	Swimming Pool	Survey	12	Layer	Concrete Rendering	5C
NMI 09	83	Swimming Pool	Survey	*	Masonry	Brick Pool Lining	5C
NMI 09	84	Swimming Pool	Survey	15	Masonry	Column Base	5D
NMI 09	85	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	86	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	87	Swimming Pool	Survey	*	Masonry	Column Base	5D

NMI 09	88	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	89	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	90	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	91	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	92	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	93	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	94	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	95	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	96	Swimming Pool	Survey	*	Masonry	Column Base	5D
NMI 09	97	Swimming Pool	Survey	*	Masonry	Inspection Chamber	6
NMI 09	98	Swimming Pool	Survey	*	Group	Group Number Phase II Pool	*
NMI 09	99	Swimming Pool	Survey	18	Layer	Demolition layer	6
NMI 09	100	Swimming Pool	Survey	*	Group	Group number Phase I Pool	*
NMI 09	101	Swimming Pool	Survey	13, 16	Masonry	External Boundary Wall	5D
NMI 09	102	Swimming Pool	Survey	18	Masonry	External Boundary Wall	5D
NMI 09	103	Swimming Pool	Survey	16	Masonry	External Boundary Wall	5D
NMI 09	104	Swimming Pool	Survey	*	Masonry	Internal Wall NE-SW	5D
NMI 09	105	Swimming Pool	Survey	16, 17	Masonry	Patch to (69)	5D
NMI 09	106	Swimming Pool	Survey	*	Masonry	Yellow brick External Wall	5D
NMI 09	107	Swimming Pool	Survey	*	Masonry	Yellow Brick Blocking	5D
NMI 09	108	Swimming Pool	Survey	*	Masonry	Yellow brick External Wall	5D
NMI 09	109	Swimming Pool	Survey	*	Masonry	Rectangular Structure	6
NMI 09	110	Swimming Pool	Survey	14	Masonry	Boundary Wall	5D
NMI 09	111	Swimming Pool	Survey	12	Structure	Concrete Pool Lining, (Inside)	5C
NMI 09	112	Swimming Pool	Survey	12	Layer	Concrete Island Infill	5C
NMI 09	113	Swimming Pool	Survey	12	Structure	Concrete Pool Base	5B
NMI 09	114	Swimming Pool	Survey	12	Layer	Disturbed Topsoil	5B
NMI 09	115	Swimming Pool	Survey	12	Layer	Subsoil	4
NMI 09	116	Swimming Pool	Survey	12	Layer	Lower Subsoil	2
NMI 09	117	Swimming Pool	Survey	*	Structure	NE-SW Wall	5D
NMI 09	118	Swimming Pool	Survey	*	Cut	Construction Cut For [97] & [109]	6

NMI 09	119	Swimming Pool	Survey	*	Fill	Infill of [118]	6
NMI 09	120	Swimming Pool	Survey	*	Cut	Preparation Cut	5B
NMI 09	121	Swimming Pool	Survey	*	Fill	Fill of [120]	5B
NMI 09	122	Swimming Pool	Survey	*	Fill	Fill of [120]	5B
NMI 09	123	Swimming Pool	Survey	*	Fill	Fill of [120]	5B
NMI 09	124	*	*	*	Void	*	*
NMI 09	125	Swimming Pool	Survey	*	Masonry	Red Brick Wall E-W	4
NMI 09	126	Swimming Pool	Survey	*	Masonry	Brick Wall E-W	4
NMI 09	127	Swimming Pool	Survey	*	Masonry	Basement Walls	4
NMI 09	128	Swimming Pool	Survey	*	Masonry	Brick Wall N-S	4
NMI 09	129	Swimming Pool	Survey	*	Pipe	Cast Iron Pipe	5D
NMI 09	130	Swimming Pool	Survey	*	Fill	Fill of [131]	5D
NMI 09	131	Swimming Pool	Survey	*	Cut	Construction Cut for Pipe [129]	5D
NMI 09	132	Swimming Pool	Survey	13	Cut	Construction Cut for [101]	5D
NMI 09	133	Swimming Pool	Survey	13	Fill	Backfill of [132]	5D
NMI 09	134	Swimming Pool	Survey	*	Masonry	Brick Wall N-S	4
NMI 09	135	Swimming Pool	Survey	*	Layer	Levelling within [100]	5B
NMI 09	136	Swimming Pool	Survey	*	Fill	Fill of [137]	4
NMI 09	137	Swimming Pool	Survey	*	Cut	Construction Cut for [127]	4
NMI 09	138	Swimming Pool	Survey	*	Cut	Construction Cut for [106], [107] & [110]	5D
NMI 09	139	Swimming Pool	Survey	*	Fill	Backfill of [138]	5D
NMI 09	140	Swimming Pool	Survey	*	Layer	Post Pool Demolition Layer	6
NMI 09	141	Swimming Pool	Survey	*	Layer	Made Ground/Levelling Deposit	6
NMI 09	142	Swimming Pool	Survey	*	Layer	Levelling Deposit	6
NMI 09	143	Swimming Pool	Survey	*	Layer	Made Ground	6
NMI 09	144	Swimming Pool	Survey	18	Layer	Pre 1833 Topsoil	2
NMI 09	145	Swimming Pool	Survey	*	Layer	Colluvial Deposit/Subsoil	4
NMI 09	146	Swimming Pool	Survey	*	Cut	Construction Cut for [68]	5D
NMI 09	147	Swimming Pool	Survey	*	Fill	Backfill of [146]	5D
NMI 09	148	Swimming Pool	Survey	18	Cut	Construction Cut for [102]	5D
NMI 09	149	Swimming Pool	Survey	18	Fill	Backfill of [148]	5D

NMI 09	150	Swimming Pool	Survey	*	Cut	Cut for Column Base [96]	5D
NMI 09	151	Swimming Pool	Survey	*	Fill	Concrete Fill of [150]	5D
NMI 09	152	Swimming Pool	Survey	*	Cut	Cut for Column Base [84]	5D
NMI 09	153	Swimming Pool	Survey	*	Fill	Concrete Fill of [152]	5D
NMI 09	154	Swimming Pool	Survey	*	Fill	Concrete Fill of [155]	5D
NMI 09	155	Swimming Pool	Survey	*	Cut	Cut for Column Base [85]	5D
NMI 09	156	Swimming Pool	Survey	*	Fill	Concrete fill of [157]	5D
NMI 09	157	Swimming Pool	Survey	*	Cut	Cut for Column Base [86]	5D
NMI 09	158	Swimming Pool	Survey	*	Fill	Concrete fill of [159]	5D
NMI 09	159	Swimming Pool	Survey	*	Cut	Cut for Column Base [87]	5D
NMI 09	160	Swimming Pool	Survey	*	Fill	Concrete fill of [161]	5D
NMI 09	161	Swimming Pool	Survey	*	Cut	Cut for Column Base [88]	5D
NMI 09	162	Swimming Pool	Survey	*	Fill	Concrete fill of [163]	5D
NMI 09	163	Swimming Pool	Survey	*	Cut	Cut for Column Base [89]	5D
NMI 09	164	Swimming Pool	Survey	*	Fill	Concrete fill of [165]	5D
NMI 09	165	Swimming Pool	Survey	*	Cut	Cut for Column Base [90]	5D
NMI 09	166	Swimming Pool	Survey	*	Fill	Concrete fill of [167]	5D
NMI 09	167	Swimming Pool	Survey	*	Cut	Cut for Column Base [95]	5D
NMI 09	168	Swimming Pool	Survey	*	Fill	Concrete fill of [169]	5D
NMI 09	169	Swimming Pool	Survey	*	Cut	Cut for Column Base [93]	5D
NMI 09	170	Swimming Pool	Survey	18	Layer	Buried Topsoil	4
NMI 09	171	Swimming Pool	Survey	18	Layer	Subsoil	4
NMI 09	172	Swimming Pool	Survey	*	Layer	Fluvial Below [171]	2
NMI 09	173	Swimming Pool	Survey	*	Layer	Natural Gravels	1
NMI 09	174	Swimming Pool	Survey	*	Masonry	Brick Wall NE-SW	4
NMI 09	175	Swimming Pool	Survey	*	Masonry	Brick Wall NE-SW	4
NMI 09	176	Swimming Pool	Survey	*	Masonry	Brick Wall N-S	4
NMI 09	177	Swimming Pool	Survey	*	Structure	Remnant of Floor Deposit Abutting Wall [103]	5D
NMI 09	178	Swimming Pool	Survey	13	Layer	Levelling Deposit	5B
NMI 09	179	Swimming Pool	Survey	*	Pipe	Cast Iron Pipe	5B

NMI 09	180	Swimming Pool	Survey	*	Layer	Horticultural Soil	4
NMI 09	181	Swimming Pool	Survey	*	Fill	Fill of Posthole [182]	5B
NMI 09	182	Swimming Pool	Survey	*	Cut	Cut of Posthole	5B
NMI 09	183	Swimming Pool	Survey	*	Fill	Fill of Posthole [184]	5B
NMI 09	184	Swimming Pool	Survey	*	Cut	Cut of Posthole	5B
NMI 09	185	Swimming Pool	Survey	18	Cut	Construction Cut for Wall [80]	4
NMI 09	186	Swimming Pool	Survey	18	Fill	Backfill of [185]	4
NMI 09	187	Swimming Pool	Survey	18	Fill	Backfill of [185]	4
NMI 09	188	Swimming Pool	Survey	19	Layer	Topsoil	6
NMI 09	189	Swimming Pool	Survey	19	Layer	Horticultural Soil	4
NMI 09	190	Swimming Pool	Survey	19	Layer	Horticultural Soil	2
NMI 09	191	Swimming Pool	Survey	19	Layer	Natural Gravels	1
NMI 09	192	Swimming Pool	Survey	20	Fill	Fill of Post-Med Well [196]	4
NMI 09	193	Swimming Pool	Survey	20	Fill	Fill of Post-Med Well [196]	4
NMI 09	194	Swimming Pool	Survey	20	Fill	Fill of Post-Med Well [196]	4
NMI 09	195	Swimming Pool	Survey	20	Fill	Fill of Post-Med Well [196]	4
NMI 09	196	Swimming Pool	Survey	20	Cut	Cut of Post-Med Well	4
NMI 09	197	Swimming Pool	Survey	20	Fill	Fill of Post-Med Well [196]	4
NMI 09	198	Swimming Pool	Survey	*	Fill	Fill of [199]	5B
NMI 09	199	Swimming Pool	Survey	*	Cut	Cut of Posthole	5B
NMI 09	200	Swimming Pool	Survey	*	Fill	Fill of [201]	5B
NMI 09	201	Swimming Pool	Survey	*	Cut	Cut of Posthole	5B
NMI 09	202	Swimming Pool	Survey	*	Cut	Cut of Posthole	5B
NMI 09	203	Swimming Pool	Survey	*	Fill	Fill of [202]	5B
NMI 09	204	Swimming Pool	Survey	*	Layer	Concrete Base to Floor [72]	5D
NMI 09	205	Swimming Pool	Survey	21	Fill	Fill of Pit [206]	2
NMI 09	206	Swimming Pool	Survey	21	Cut	Cut of Pit	2
NMI 09	207	Swimming Pool	Survey	*	Cut	Cut of N-S Gully	2
NMI 09	208	Swimming Pool	Survey	*	Fill	Fill of [207]	2
NMI 09	209	Swimming Pool	Survey	*	Cut	E-W Ditch	2
NMI 09	210	Swimming Pool	Survey	*	Fill	Fill of [209]	2

NMI 09	211	Swimming Pool	Survey	*	Group	Rectangular Sunken Room	*
NMI 09	212	Swimming Pool	Survey	*	Structure	Brick Floor, Part of [211]	4
NMI 09	213	Swimming Pool	Survey	*	Structure	Brick Wall, Part of [211]	4
NMI 09	214	Swimming Pool	Survey	*	Structure	Brick Wall, Part of [211]	4
NMI 09	215	Swimming Pool	Survey	*	Structure	Brick Wall, Part of [211]	4
NMI 09	216	Swimming Pool	Survey	*	Cut	Construction Cut for Wall [125]	4
NMI 09	217	Swimming Pool	Survey	*	Fill	Backfill of [216]	4
NMI 09	218	Swimming Pool	Survey	*	Cut	Construction Cut for Wall [215]	4
NMI 09	219	Swimming Pool	Survey	*	Fill	Backfill of [218]	4
NMI 09	220	Swimming Pool	Survey	*	Cut	Robber Cut	4
NMI 09	221	Swimming Pool	Survey	*	Fill	Fill of [220]	4
NMI 09	222	Swimming Pool	Survey	*	Fill	Backfill of Pipe Trench [224]	5D
NMI 09	223	Swimming Pool	Survey	*	Pipe	Cast Iron Pipe	5D
NMI 09	224	Swimming Pool	Survey	*	Cut	Cut of Pipe Trench	5D
NMI 09	225	Swimming Pool	Survey	*	Fill	Fill of [226]	2
NMI 09	226	Swimming Pool	Survey	*	Cut	Fire Pit	2
NMI 09	227	Swimming Pool	Survey	*	Masonry	Drain	4
NMI 09	228	Cemetery	*	*	Fill	Fill of Grave [230]	4
NMI 09	229	Cemetery	229	*	Skeleton	Skeleton in Grave [230]	4
NMI 09	230	Cemetery	230	*	Grave Cut	Cut of Grave	4
NMI 09	231	Cemetery	*	*	Fill	Fill of Grave [233]	4
NMI 09	232	Cemetery	232	*	Skeleton	Skeleton in Grave [233]	4
NMI 09	233	Cemetery	233	*	Grave Cut	Cut of Grave [227]	4
NMI 09	234	Cemetery	*	*	Fill	Back fill of Drain [227]	4
NMI 09	235	Cemetery	235	*	Cut	Cut For Drain	4
NMI 09	236	Cemetery	*	*	Fill	Fill of Charnel Pit [237]	4
NMI 09	237	Cemetery	237	*	Cut	Cut of Charnel Pit	4
NMI 09	238	Cemetery	238	*	Coffin	Coffin for Skeleton (232)	4
NMI 09	239	Cemetery	239	22 - 25	Group	Tudor Road	3
NMI 09	240	Cemetery	*	*	Fill	Fill of Grave [230]	4
NMI 09	241	Cemetery	241	*	Skeleton	Skeleton in Grave [230]	4

NMI 09	242	Cemetery	*	*	Fill	Fill in Grave [244]	4
NMI 09	243	Cemetery	243	*	Skeleton	Skeleton in Grave [244]	4
NMI 09	244	Cemetery	244	*	Grave Cut	Cut of Grave	4
NMI 09	245	Cemetery	*	*	Fill	Fill of Grave [233]	4
NMI 09	246	Cemetery	246	*	Skeleton	Skeleton in Grave [233]	4
NMI 09	247	Cemetery	*	*	Fill	Fill of Grave [250]	4
NMI 09	248	Cemetery	248	*	Skeleton	Skeleton in Grave [250]	4
NMI 09	249	Cemetery	249	*	Coffin	Coffin for Skeleton (248)	4
NMI 09	250	Cemetery	250	*	Cut	Cut of Grave	4
NMI 09	251	Cemetery	*	*	Fill	Fill of Grave [244]	4
NMI 09	252	Cemetery	252	*	Skeleton	Skeleton in Grave [244]	4
NMI 09	253	Cemetery	253	*	Coffin	Coffin for Skeleton (252)	4
NMI 09	254	Cemetery	254	*	Coffin	Coffin for Skeleton (243)	4
NMI 09	255	Cemetery	255	*	Coffin	Coffin for Skeleton (246)	4
NMI 09	256	Cemetery	*	22	Layer	Part of Road Group [239]	3
NMI 09	257	Cemetery	*	22	Layer	Part of Road Group [239]	3
NMI 09	258	Cemetery	*	22	Layer	Part of Road Group [239]	3
NMI 09	259	Cemetery	*	22	Layer	Part of Road Group [239]	3
NMI 09	260	Cemetery	*	23	Layer	Part of Road Group [239]	3
NMI 09	261	Cemetery	*	23	Layer	Part of Road Group [239]	3
NMI 09	262	Cemetery	*	23	Layer	Part of Road Group [239]	3
NMI 09	263	Cemetery	*	24	Layer	Part of Road Group [239]	3
NMI 09	264	Cemetery	*	24	Layer	Part of Road Group [239]	3
NMI 09	265	Cemetery	*	24	Layer	Part of Road Group [239]	3
NMI 09	266	Cemetery	*	24	Layer	Part of Road Group [239]	3
NMI 09	267	Cemetery	*	24	Layer	Part of Road Group [239]	3
NMI 09	268	Cemetery	*	24	Layer	Part of Road Group [239]	3
NMI 09	269	Cemetery	*	25	Layer	Part of Road Group [239]	3
NMI 09	270	Cemetery	*	25	Layer	Part of Road Group [239]	3
NMI 09	271	Cemetery	*	25	Layer	Part of Road Group [239]	3
NMI 09	272	Cemetery	*	25	Layer	Part of Road Group [239]	3

NMI 09	273	Cemetery	*	25	Layer	Part of Road Group [239]	3
NMI 09	274	Cemetery	*	25	Layer	Part of Road Group [239]	3
NMI 09	275	Cemetery	*	25	Layer	Part of Road Group [239]	3
NMI 09	276	Cemetery	*	25	Layer	Part of Road Group [239]	3
NMI 09	277	Cemetery	*	25	Layer	Part of Road Group [239]	3
NMI 09	278	Cemetery	*	*	Fill	Fill of Grave [280]	4
NMI 09	279	Cemetery	279	*	Skeleton	Skeleton in Grave [280]	4
NMI 09	280	Cemetery	280	*	Grave Cut	Cut of Grave	4
NMI 09	281	Cemetery	*	*	Fill	Fill of Grave [250]	4
NMI 09	282	Cemetery	282	*	Skeleton	Skeleton in Grave [250]	4
NMI 09	283	Cemetery	*	*	Fill	Fill of Grave [244]	4
NMI 09	284	Cemetery	*	*	Fill	Fill of Grave [287]	4
NMI 09	285	Cemetery	285	*	Skeleton	Skeleton in Grave [287]	4
NMI 09	286	Cemetery	*	*	Fill	Coffin for Skeleton (285)	4
NMI 09	287	Cemetery	287	*	Grave Cut	Cut of Grave	4
NMI 09	288	Cemetery	288	*	Skeleton	Skeleton in Grave [280]	4
NMI 09	289	Cemetery	*	*	Fill	Fill of Grave [280]	4
NMI 09	290	Cemetery	*	*	Fill	Fill of Grave [250]	4
NMI 09	291	Cemetery	291	*	Skeleton	Skeleton in Grave [250]	4
NMI 09	292	Cemetery	*	*	Fill	Fill of Grave [280]	4
NMI 09	293	Cemetery	293	*	Skeleton	Skeleton in Grave [280]	4
NMI 09	294	Cemetery	*	*	Fill	Fill of Grave [296]	4
NMI 09	295	Cemetery	295	*	Skeleton	Skeleton in Grave [296]	4
NMI 09	296	Cemetery	296	*	Grave Cut	Cut of Grave	4
NMI 09	297	Cemetery	*	26	Fill	Fill of Ditch [298]	3
NMI 09	298	Cemetery	Survey	26	Cut	Cut of Roadside ditch	3
NMI 09	299	Pipe Trench	*	*	Layer	Topsoil	6
NMI 09	300	Pipe Trench	Pipe Trench	*	Layer	Made Ground	5
NMI 09	301	Pipe Trench	Pipe Trench	*	Fill	Demolition backfill	6
NMI 09	302	Pipe Trench	Pipe Trench	*	Masonry	Wall attached to east wall of Church	5A
NMI 09	303	Pipe Trench	Pipe Trench	*	Masonry	East wall of Church	5A

NMI 09	304	Pipe Trench	Pipe Trench	*	Masonry	Internal wall of Church	5A
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APPENDIX 2: POTTERY ASSESSMENT

By Chris Jarrett

Introduction

A small sized assemblage of pottery was recovered from the site (1 box). The pottery dates from the medieval and post-medieval periods. Very few sherds show evidence for abrasion and were probably deposited fairly rapidly after breakage. The fragmentation of the pottery ranges from sherd material to identifiable forms but none of the vessels have a complete profile. Pottery was recovered from six contexts and individual deposits produced small sized groups of pottery (fewer than 30 sherds).

All the pottery (25 sherds and none are unstratified) was examined macroscopically and microscopically using a binocular microscope (x20), and recorded in an ACCESS 2007 database, by fabric, form, decoration, sherd count and estimated number of vessels (ENV's). The classification of the pottery types is according to the Museum of London Archaeological Service. The pottery is discussed by types and its distribution.

The Pottery Types

Medieval

Local glazed wares

Coarse London-type ware (LCOAR), 1080-1200, seven sherds, form: jar.

Wheel-thrown coarsewares

South Hertfordshire-type greyware (SHER), 1170-1350, eleven sherds, form: jar; rounded.

Post-medieval

Local red earthenwares

London-area post-medieval slipped redware with clear (yellow) glaze (PMSRY), 1480-1650, one sherd, forms: open.

Surrey-Hampshire border wares

Surrey-Hampshire border whiteware (BORD), 1550-1700, one sherd, form: ?tripod pipkin handle.

Surrey-Hampshire border whiteware with green glaze (BORDG), 1550-1700, one sherd, form: unidentified.

Surrey-Hampshire border whiteware with yellow glaze (BORDY), 1550-1700, one sherd, form: ?open.

English tin-glazed ware

Tin-glazed ware with plain pale-blue glaze (TGW BLUE), 1630-1846, one sherd, form: chamber pot.

Industrial finewares

Developed Creamware (CREA DEV), 1760-1830, one sherd, form: plate.

Imported wares

Low Countries

Dutch redware (DUTR), 1480-1650, one sherd, form: unidentified.

Distribution

Table 1 shows the contexts containing pottery, the number of sherds, the pottery types in the deposit and a spot date for the group.

Context	Phase	Sherd count	Date range pottery types	of Latest dated pottery type	Fabric types	Spot date
[196]	4	1	1630-1846	1630-1846	TGW BLUE	18 th Century
[225]	2	18	1080-1350	1170-1350	LCOAR, SHER	1170-1350
[231]	4	2	1550-1830	1760-1830	BORDG, CREA DEV	1760-1830
[242]	4	1	1300-1650	1300-1650	DUTR	1480-1650
[284]	4	2	1480-1700	1550-1700	BORDY, PMSRY	1550-1650

Context	Phase	Sherd count	Date range of pottery types	Latest dated pottery type	Fabric types	Spot date
[297]	3	1	1550-1700	1550-1700	BORD	1550-1700

Table 1. NMI09: Distribution of pottery types showing individual contexts containing pottery, what phase the context occurs in, the number of sherds, the date range of the latest pottery type, the fabrics present and a suggested deposition date. SC: sherd count.

Significance Of The Collection

The pottery has no significance at a local level. The assemblage reflects activity on the site from the late 12th century until the early 19th century. The pottery is in keeping with the ceramic profile for the London area.

Potential

The pottery has the potential to date the features in which it was found and to provide a sequence for them. None of the vessels would merit illustration

Research aims

There are no research aims suggested as avenues of further research.

Recommendations for further work

No further work is recommended on the ceramic pottery assemblage from this site. For the publication of the site it is recommended that information is taken from this assessment report.

APPENDIX 3: CLAY TOBACCO PIPE ASSESSMENT

By Chris Jarrett

Introduction

A small sized assemblage of clay tobacco pipes was recovered from the site (1 box). Most fragments are in a fairly good condition, indicating that they had not been subject to too much redeposition or were deposited soon after breakage. Clay tobacco pipes occur in six contexts as small groups (under 30 fragments).

All the clay tobacco pipes (seven fragments and none are unstratified) were recorded in an ACCESS 2007 database and classified by Atkinson and Oswald's (1969) typology (AO) and 18th-century examples by Oswald's (1975) typology and prefixed OS. The pipes are further coded by decoration and quantified by fragment count. The degree of milling has been noted and recorded in quarters, besides the quality of finish. The tobacco pipes are discussed by their types and distribution.

The Clay Tobacco Pipe Types

The clay tobacco pipe assemblage from the site consists of two bowls and five stems. The clay tobacco pipe bowl types are dated 1680-1710 and 1780-1830.

1680-1710

AO22: a single straight-sided heeled bowl with no milling and a fair finish.

1780-1830

AO27: one square heel from this type of bowl and it is marked W B, probably for a local pipe maker William Burstow 1, who is recorded first in 1781 as working near Deptford Bridge, in 1800 he is documented at Cold Bath Row and he died in 1811 (Bowser and Woollard 2000, 10).

Distribution

Table 1 shows the distribution of the clay tobacco pipes, showing the number of fragments, the date range of the types and the latest bowl, the types of bowls present, together with a spot date for each context tobacco pipes occur in.

Context Phase	No. of fragments	Date range of bowl types	Latest dated bowl type	Bowl types (and makers)	Spot date	
[170]	4	1	1680-1710	1680-1710	AO22	1680-1710
[194]	4	2			Stem	1580-1910
[231]	4	1			Stem	1580-1910
[242]	4	1	1780-1830	1780-1830	AO27 (W B)	1780-1830
[248]	4	1			Stem	1580-1910
[278]	4	1			Stem	1580-1910

Table 1. NMI07. Distribution of clay tobacco pipes. A spot date of 1580-1910 indicates that only stems were present in the context

Significance Of The Collection

The clay tobacco pipes are of little significance at a local level, but a local pipe maker is recognised by one marked bowl. The forms present are typical for London.

Potential

The clay tobacco pipes have the potential to date the contexts they were found in. None of the pipes merit illustration.

Research Aims

No research aims are suggested as further avenues of research.

Recommendations For Further Work

No further work is recommended and any information required from a publication should be taken from this assessment report.

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APPENDIX 4: BUILDING MATERIALS

By Dr Kevin Hayward

Introduction and Aims

Six boxes, 4 crates of ceramic building material, concrete and stone and an additional crate consisting of larger pieces of worked stone were retained at excavation from the site at the National Maritime Museum, Greenwich.

This moderate sized assemblage (146 examples 112.8kg) was assessed in order to:

- Identify (under binocular microscope) the fabric and forms of the post-medieval whole brick samples and mortar to date the 1830s swimming pool and subsequent alterations.
- Identify (under binocular microscope) the fabric and forms of the brick, roofing tile and stone samples and mortar to corroborate with the dating evidence from the earlier 16th century road surface, mid 18th century cemetery and later boundary wall, cellar structure and drains.
- Identify the fabric and form of concrete used to line the pool.
- Made recommendations for further study.

Methodology

With most of the structures, whole brick samples (and large chunks of concrete pool lining) were retained in order to determine their construction date. Where this was not possible *in-situ* recording was undertaken. For the remaining contexts especially from the earlier post-medieval cemetery, well and road surface, tile, brick and stone was retained.

The building material was examined using the London system of classification with a fabric number allocated to each object. The application of a 1kg mason's hammer and sharp chisel to each example ensured that a small fresh fabric surface was exposed. The fabric was examined at x20 magnification using a long arm stereomicroscope or hand lens (Gowland x10).

The ceramic building material and stone was retained for archive for the National Maritime Museum, Greenwich site.

Ceramic Building Material

One would expect, given the proximity of the of the Tudor Greenwich Palace or the Palace of Placentia, the later 17th-19th century Royal Naval Hospital and late 19th century Naval College that post medieval materials would dominate this assemblage. This is borne out by the absence of medieval building materials and the near dominance of post-medieval and early modern fabrics in the assemblage (99%+) including those associated with the 1830s Swimming Baths.

Prehistoric

No prehistoric worked stone was recovered.

Roman

Early London Sandy Fabric Group 2452 (AD 55-160) 235g

Tiny quantities of broken up of early first and second century Roman ceramic building material including tile and brick were recovered from a medieval ditch [225] and the fill associated with an 18th century inhumation [252] from the vicinity of the cemetery. This was to be expected given the proximity of the Roman Temple at Greenwich excavated in the first decade of the 20th century.

Saxon

No Saxon worked stone was recovered

Medieval

No medieval building material was recovered.

Post-Medieval

Brick 81 examples 77.1kg

This large assemblage can be subdivided into early post-medieval red (Tudor) brick fabrics restricted to the Phase 3 road surface group and re-used in Phase 4 grave fills later drains and later post-Great Fire mauve and maroon stock bricks used in the Phase 3 road surface but also in the Phase 4-5 structures near to and including the swimming baths. On top of this more recent (Late 18th-mid 20th century) yellow London stock bricks and (mid 19th century+) kiln bricks are restricted in their use to the Phase 5 pool and subsequent alterations.

a) Tudor Red Bricks 36 examples 16.2kg

Fabrics 3033; 3039; 3046 (1450-1700)

Poorly made unfrogged, wide (110mm) and shallow (48-58mm) red bricks of a variety of fabrics were nearly all observed in the Phase 3 (16th century) road group [239] e.g. [260] [262]. They all exhibit a soft white mortar typical of this phase. They are all fragmentary and may well have been recycled from the initial build and/or subsequent alteration of the nearby 1485 Riverside Tudor Palace or even Copped Hall to use to pave the major Deptford-Woolwich highway.

Elsewhere they turn up in the fill of the 18th century naval cemetery [284], reused in late 18th-early 19th century drains [29] or in the fill of the pre-1833 well [194] [197].

Two further comments of note: the absence of later Victorian reds in the swimming baths and earlier cellar (cold storage) and the recycling of these early Tudor red bricks in these later structures. Fresh consignments of later brick were clearly being brought in for subsequent building projects which are not surprising given the influence of naval brickworks in the Chatham area.

b) Post-Great Fire Bricks 30 examples 30.3kg

3032; 3034; 3034nr3035 (1664-1900)

3032nr3033 (1664-1725)

Examples of stock moulded frogged and unfrogged purple and maroon bricks (1664-1900) with clinker inclusions that characterise bricks following the Great Fire are present in some quantity in a number of different parts of the site. Variation in fabric, form (frogged or unfrogged, shape, thickness) and mortar type (shell mortar; Portland; Roman) do at least provide a better indication of age.

First are the large quantity of unfrogged broken stock moulded bricks with the early transitional maroon fabric *3032nr3033* (1664-1725) together with poorly made unfrogged narrow (85-95mm) *3032; 3034* bricks with sunken margins used together with broken Tudor bricks only as part of the early post-medieval road group in [267]. Early post-Great Fire bricks are characterised by these fabrics and forms elsewhere in London (Hayward pers. obs.).

Second, are a quantity of whole unfrogged purple *3032* and *3034* bricks used in the Phase 4 (1749-1823) structures e.g. boundary wall [2] [25] [80], drains [17] [27] [29] [30] and observed in the (cold storage? cellar) [176] [215]. What sets this group apart from earlier as well as later use of these bricks at Greenwich is the presence of a very shelly, soft pink/cream mortar with occasional flecks of charcoal. This mortar typifies late 18th/early 19th century constructions throughout London e.g. British Museum and later additions to the Bushy Park Cascade. The

later construction phases of the cellar that are not on the oblique alignment [178] [213] were observed to have a slightly harder shelly mortar with some brick flecks.

Finally, the frogged 3032; 3034 and 3034nr3035 bricks (1750-1900) were used during the construction, relining and roofing of the pool from 1833 to 1900 as well as construction of the ancillary buildings (e.g. boiler-house). These have circular marks within the frog such as the Phase 5d oval perimeter wall [101] that are seen elsewhere in London such as the mid 19th century Kings Cross (Hayward pers. obs.). Also these brick types are bonded with hard 19th century cements including white-grey Portland, brown Roman and a brown gravel cement (see table of mortar types below).

c) Yellow London Stock Bricks 10 examples 25.6kg

3035 (1780-1940)

Consignments of bright yellow, well made (sometimes machine) whole frogged 3035 bricks that typify Late 18th-early 20th century construction projects throughout London are found almost entirely in the lining [101] of the Phase 5b-d Victorian pool and associated sunken buildings [102] and flues [70].

It was, however, observed in the upper courses of the sunken building [126] suggesting an earlier 19th century use in tiny quantities perhaps for repair to this and the floor [212]. The mortar here was a softer shellier fabric.

It is during Phase 5d (1875+) that this brick becomes more important than the purple frogged Great Fire bricks (these are not produced after 1900). Like the 3032 bricks these are bonded with a number of hard 19th century cement types including Portland, Roman and Brown Gravel (see mortar table below). They are also used to support the cast iron column bases [84-96] for the roofing of the pool in 1875. One feature of interest is the widespread manufacture and supply of these bricks from the estuarine clays of the Medway Estuary close to the naval dockyards at Chatham (Perks 1981).

The navy may well have supplied these bricks to Greenwich as they also turn up in large quantities at Portsmouth naval dockyards (Hayward pers. obs.)

d) Kiln Bricks 2 examples 3.2kg

3261 [1800-1950]

The presence of two high alumina bricks [68] [197] at Greenwich is surprising as they are normally associated with high temperature industrial processes. One stamped example [68] of which only the first 3 letters LUC are decipherable turns up in the Phase 5d (1875+) Stairwell

of the adjoining sunken room can be explained as it lies close to a flue [70] used to heat the pool water and could have been reused. The other turns up in a surprisingly early context in the fill of a Phase 4 well [197]. Kiln bricks, however, are manufactured from the early 19th century at Stourbridge in the West Midlands – but what its function was in this case is not clear.

Mortar and Concrete

A summary of mortar types and concrete as well as their period of use from the excavations at NMI 09 are given below and provide a chronological framework, which along with the brick, help decipher some of the building phases at Greenwich.

Mortar/Concrete Type	Description	Use at NMI-09
<i>Early Lime Mortar</i>	Soft white – light brown mortar with chalk fragments	Phase 3 (16 th century) Road Group [260] [262]
<i>Shelly Mortar</i>	Soft white mortar with flecks of charcoal, brick and large complete bivalves and gastropods estuarine origin	Late Phase 4 (1750-1823) Boundary Wall [2] [25] [80]; Drains e.g. [17] and early parts of cold storage cellar [176] [215] A slightly different version – harder with more brick inclusions is present in the later phases of the storage cellar [175] [178] [213]
<i>Dark Concrete – Moulded into cornices with a thin 1-2mm arricio and ocean blue and white fresco</i>	Dark grey concrete with large flint inclusions - local source	Found in Phase 5b (1833) deposits associated with pool [133]. In [78] skim of Phase 5c [1839] Renovation [78] and 50kg of Phase 6 dumped deposits concrete [140] as mouldings
<i>Portland Cement Patented 1830s</i>	Hard white-grey mortar	Phase 5 (1875) reconstruction of pool including oval perimeter [101] and sunken room buildings [67] [68] [102] with brick fabric 3035
<i>Roman Cement 1790s+ (most prob 2nd half 19th century at Greenwich)</i>	Fresh locally hard brown mortar	Phase 5c brick lining [83] but also in Phase 5d entrance [108] to sub oval room [101]
<i>Grey Brown Gravel Mortar</i>	Like Roman cement but with lots of rock fragments Gravel mortar used a lot from 1870 on	Phase 5d [69] [105] subterranean room later tidying up work
<i>Very Coarse loose Pebbly Concrete</i>	Like opus signinum – the use of gravel concrete comes into force from 1870 onwards	Phase 5d floor lining of [177]

The gravel cement is the youngest as these came into use after 1870s and are associated with patching up of the pool in Phase 5d. Portland and Roman cements are in use during Phase 5c and 5d construction of the pool. Shelly mortar is a late 18th/early 19th century fabric, with the soft lime mortar an early post-medieval fabric.

The concrete used to waterproof the pool during its 1833 and 1839 construction including render [82] warrants further investigation. This is an extremely hard dark grey concrete with large (up to 2-3 cm) chunks of flint. The concrete has been poured into cornice like mouldings of two varieties. Type 1 has a semi-circular profile 90mm high before gradually tapering down in a series of peaks and troughs to 50mm. Type 2 is much smaller rising from 35mm to 55mm in a series of undulations. Both have *arrico* and a white and ocean blue striped *fresco* and were evidently used to decorate the sides of the pool.

Given that this type of concrete is associated with the lining and decoration of the 1830s pool, before the widespread availability of Portland cement and the coarse gravelly concretes of the late 1880s this must represent some sort of early concrete patent. The dockyards at Chatham had waterproof concrete in 1834 patented by the 'contractor Ranger'... 'using a 1:6 lime: gravel combination mixed with hot water and compressed between timber forms' (Sutherland et al. 2004, 119). George Ledwell Taylor, architect for the government 'used Rangers patent in Chatham and Woolwich dockyards' (Sutherland et al. 2004, 119) from the late 18th century, so the use of one of these pioneering concrete types in what was essentially a naval pool does not seem so surprising. Further analysis and research is required (see recommendations).

Peg Tiles 25 examples 1.4kg

London Sandy Fabrics 2271 (1180-1800)

2276 (1480-1900)

London Iron Oxide Fabric 2586 (1180-1800)

Included within the Phase 3 fill of the roadside ditch [297] and Phase 4 fill of the mariners graveyard [278] are a small collection of early post-medieval unglazed peg tile. They are all of a form and fabric (s) that are consistent with the construction of the Tudor riverside palace or an associated building.

Pan Tile 2 examples 156g

London Sandy Fabric 2279 (1630-1850)

Pan Tiles for roofing constructed after 1630 are found in the fill of the mariners graveyard [242] [284] and attest to the roofing of a late 17th or 18th century building in the vicinity.

Floor or Wall Tile 15 examples 6kg

3261

A group of white glazed rectangular wall or floor tiles (230mm x 71mm x 20mm) were recovered from the Phase 6 demolition debris [140]. They are made from a kiln brick fabric 3261 and were probably used on the side of the pool or in one of the ancillary buildings (e.g. changing rooms).

Stone 2 examples 30g

3110 Portland Whit Bed – Upper Jurassic Isle of Portland, Dorset

Observed in-situ

3120 Shelly Purbeck Limestone – Upper Jurassic Isle of Purbeck, Dorset

3120 York Stone – Upper Carboniferous, Yorkshire

3114 North Wales Slate – Palaeozoic North Wales

The types of rock from this tiny assemblage of retained stone as well as that observed *in situ* are all consistent with post-medieval material use in London.

Chunks of Portland Whit Bed quarried from the Dorset coast and only found in the naval grave fills [282] [288] may attest to grave markers. This stone became common place in London from the 17th century, as it was only then that this hard oolitic limestone could be sawn and cut with the necessary tools. Its association with the Navy has been observed at Portsmouth and its use as grave markers is well attested to throughout London.

Observed *in situ* as blocks within the possible cooling cellar floor [212] of Phase 4 are large blocks of Purbeck Limestone. This material was also quarried from the Dorset coast for use by the Navy in the dockyards at Portsmouth.

York stone [72] and North Wales Slate used during the construction of the pool are typical material choices for 19th century London.

Phase Summary

Phase 1-2: Natural and medieval

Other than some tiny quantities of residual early Roman brick and tile found in a medieval ditch [225] there is no evidence for pre-1485 occupation buildings and or activity from the building material assemblage.

Phases 3: Early Post-Medieval 16th century (+)? Greenwich to Woolwich Road

The building material retained from the Phase 3 (16th century) road group [239] and roadside ditch fill consists almost entirely of poorly made unfrogged, wide (110mm) and shallow (48-58mm) red bricks of a variety of fabrics 3033; 3039; 3046. They all exhibit a soft white mortar typical of this period. They are all fragmentary and may well have been recycled from the initial build and/or subsequent alteration of the nearby 1485 Riverside Tudor Palace or even Copped Hall to use to pave the major Deptford-Woolwich highway. Peg tiles from this phase 2276; 2271; 2586 are also early post-medieval.

The exception is a large quantity (6.7kg) of early unfrogged broken post-Great Fire bricks 3032; 3032nr3033 and 3034 (1664-1750) together with some Tudor brick from [267].

Providing an explanation for their presence in what is essentially a Phase 3 16th century road surface is not so straightforward. However, given that the top of this road surface was truncated by subsequent construction episodes – it is possible that remnants of the upper (later) road surface may have filtered down from above into what remained of this early road. It is possible that the road remained in use until 1749, well after this bricks first came into use.

Phases 4: Later Post-Medieval 1749-1823 Naval Cemetery; Boundary Wall Cellar; Drains and Well

The structures from this later post-medieval phase i.e. the boundary wall; drains and sunken building (cold store) ,that formed part of the 18th century naval hospital, have essentially the same brick fabric type 3032 (1664-1900) and mortar. This is a very shelly, soft pink/cream mortar with occasional flecks of clinker and sometimes brick, typical of other late 18th/early 19th century constructions throughout London e.g. British Museum. These similarities suggest that the boundary wall, cellar features and services were all broadly constructed over the same period, using fresh consignments of post-Great Fire bricks. The later changes to the cellar area including the addition of a few yellow 3035 bricks (1780-1940) and harder, shelly cement suggest some alterations and extensions towards the end of this period.

In the fill of the naval graves were small chunks of Portland whit bed a rock commonly associated with grave markers from the 18th century onwards throughout London. Indeed the use of Purbeck shelly limestone in the cellar floor [82] suggest a preference for the quarry, supply use of stone materials from the Dorset coast by the navy– a feature also seen in the Naval Dockyard at Portsmouth

Phase 5a-5d: Victorian to early modern (1824-1935)

It was not possible to comment on the form and fabric of brick from the walling of the early 19th century St Mary's Church examined at the evaluation stage and the mid 20th century

demolition fill [140] of the pool and church revealed no material that could relate to this structure.

The initial construction (Phase 5b), re-lining (Phase 5c) and alterations (Phase 5d) to the pool are marked by a wholesale change in brick fabric and form and more especially in the use of hard waterproof mortars and cement.

Frogged 3032; 3034 and 3034nr3035 bricks (1750-1900) were used during the, re-lining [83] in 1839 bonded in a brown Roman cement patented in 1798 as well as in the Phase 5d oval perimeter water in a gravel mortar (1870). The use of light grey Portland cement (patented in the 1840s) in these bricks shows the range of waterproof cements available at this time. It is the widespread use of the yellow London stock brick that defines the roofing and extension (including the boiler rooms) during Phase 5d (1875). These bricks manufactured in the Medway area close to the naval dockyard at Chatham are often associated with naval constructions both in the Thames Estuary and Portsmouth (Hayward pers. obs.).

This link with Chatham can be extended by the use of a very hard dark grey waterproof concrete in this phase [82], with flint inclusions to render and surface the pool from at least 1839. The concrete is in two definable mould types, both found in demolition layer [140] from Phase 6 each with a layer of plaster *arricio* and white and ocean blue striped *fresco*. Given that this type of concrete is associated with the lining and decoration of the 1830s pool, before the widespread availability of Portland cement and the coarse gravelly concretes of the late 1880s this must represent some sort of early concrete patent. The dockyards at Chatham had waterproof concrete in 1834 patented by the 'contractor Ranger'... 'using a 1:6 lime: gravel combination mixed with hot water and compressed between timber forms'. Sutherland et. al. 2004, 119) George Ledwell Taylor, architect for the government 'used Rangers patent in Chatham and Woolwich dockyards' (Sutherland et. al. 2004, 119) from the late 18th century, so the use of one of these pioneering concrete types in what was essentially a naval pool does not seem so surprising. Further analysis and research is required (see recommendations).

Finally Kiln bricks are used the stamp LUC only partially visible [68] this would have been associated with flues and the heating of the pool. The improved rail communications during the latter part of the 19th century would have facilitated transport of these bricks from the coal measures of northern England or Scotland.

Phase 6: mid 20th century demolition (1936)

The demolition of the pool is marked by over 50kg of moulded concrete and wall/floor tiles from [140] but nothing from St Mary's Church.

Distribution

Context	Fabric	Form	Size	Date range of material		Latest dated material		Spot date
2	3032 3101	Post-Great Fire brick White Shelly Mortar	1	1666	1900	1666	1900	1750-1850
17	3032 3033 3101	Post-Great Fire brick and Tudor red brick shelly pink mortar	2	1450	1900	1666	1900	1750-1850
25	3034 3101	Post-Great Fire brick shelly pink mortar	2	1666	1900	1666	1900	1750-1850
27	3034	Post-Great Fire brick shelly pink mortar	1	1666	1900	1666	1900	1750-1850
29	3046 3101	Red brick prob reused white shelly mortar	1	1450	1850	1750	1850	1750-1850
30	3032 3101	Post-Great Fire brick soft pink shelly mortar	1	1666	1900	1666	1900	1750-1850
67	3035	Yellow stock brick frogged Portland mortar	1	1830	1940	1830	1940	1830-1940
68	3035 3261	Deep frog yellow brick and kiln	2	1780	1950	1800	1950	1875-1950

Context	Fabric	Form	Size	Date range of material		Latest dated material		Spot date
		stamped LUCAS English brick Portland mortar						
69	3035 3101	London yellow grey gravelly mortar	1	1780	1940	1780	1940	1870-1940
71	3035	Yellow London stock frogged	2	1780	1940	1780	1940	1800-1900
80	3032	Post-Great Fire brick shelly mortar	2	1666	1900	1666	1900	1750-1850
83	3034nr3035	Yellow London stock frogged Roman cement	2	1780	1940	1780	1940	1850-1940
101	3032 3035 3101	Post-Great Fire brick and London yellow Portland cement	4	1666	1940	1780	1940	1830-1900
102	3032	Post-Great Fire brick frogged grey Portland mortar	3	1750	1900	1750	1900	1830-1900
103	3032	Post-Great Fire brick soft mortar (reused?)	1	1666	1900	1666	1900	1700-- 1850
105	3032	Post-Great	2	1666	1940	1780	1940	1830-1900

Context	Fabric	Form	Size	Date range of material		Latest dated material		Spot date
	3035	Fire brick and yellow London Roman gravel cement						
108	3035 3032	Post-Great Fire frogged Roman cement	2	1780	1940	1780	1940	1850-1940
140	3101 3261 3035 Wall Tile fabric	Lots of reused moulded concrete blue paint white plaster Kiln brick Wall tile Yellow Stock	16	1780	1950	1830	1950	1875-1950
170	3033	Red Tudor brick frag	1	1450	1700	1450	1700	1450-1700+
194	3032 3034 2276	Post-Great Fire brick and post med peg tile	4	1480	1900	1666	1900	1666-1850
197	3261 3032 3039	Intrusive? kiln brick, Post-Great Fire brick and transitional brick	4	1450	1950	1800	1950	1850-1950
225	2452	Roman brick reused	1	55	160	55	160	55-160+
231	2276 3032	Post-Great Fire brick	4	1480	1900	1666	1900	1666-1900

Context	Fabric	Form	Size	Date range of material		Latest dated material		Spot date
		and post-med roofing tile						
242	2279	Pan tile	1	1630	1850	1630	1850	1630-1850
252	2452	Reused Roman tile	1	55	160	55	160	55-160+
260	3033	Red stock brick wide and thin	3	1450	1700	1450	1700	1450-1700
262	3033	Red stock brick narrow and thin 49mm	1	1450	1700	1450	1700	1450-1700
267	3033 3032nr3033 3032 3039	Red stock brick a lot thin (49-50mm) but narrow 99 except 1 110mm and rest post-Great Fire and transitional	28	1450	1700	1450	1700	1666-1800
278	2271 2276 2586	Peg Tile	10	1180	1900	1480	1900	1480-1900
282	2271 3110	Peg Tile Portland Whit Bed	2	1180	1900	1664	1900	1664-1850
284	3032 3039 2271 2279	Post-Great Fire brick, early peg tile, pan tile transitional brick	6	1180	1900	1666	1900	1666-1800

Context	Fabric	Form	Size	Date range of material		Latest dated material		Spot date
288	3110	Portland Whit Bed stone	1	1660	1900	1660	1900	1664-1900
289	3039 2271 2586	Red brick transitional unglazed early post- med peg tiles	4	1180	1800	1180	1800	1450- 1700+
294	3046 3039 2586	Red brick and transitional brick and early post- med tiles	5	1180	1800	1180	1800	1450- 1700+
297	3039 2586	Transitional brick and early post- med tile	6	1180	1800	1180	1800	1500- 1700+

Recommendations

a) Retention

As the site lies within the 'Maritime Greenwich' World Heritage Site, all of the building material has been retained. However, as a result of the diverse mortar and concrete types from the various phases of construction a comparative reference collection of mortar types will be assembled at PCA for future projects in and around the London area.

b) Significance

This assemblage contains a number of items of interest that require further research and comparison to be included at the publication stage.

- The concrete mouldings used to line the 1833 pool represent some of the earliest examples of waterproof mortar in the country. The fabric needs to be looked at and compared with other contemporary naval and merchant navy projects, e.g. in the lining of docks from London, to see if this is unique or not. Especially given that the

dockyards at Chatham had waterproof concrete in 1834 patented by the 'contractor Ranger'...' using a 1:6 lime: gravel combination mixed with hot water and compressed between timber forms' (Sutherland et al. 2004, 119). George Ledwell Taylor, architect for the government 'used Rangers patent in Chatham and Woolwich dockyards' (Sutherland et al. 2004, 119).

- A study needs to be made into this waterproof concrete and mortar fabrics and forms used in these early-mid 19th century swimming baths and to line and demarcate Victorian beach areas such as those at Ilfracombe (Hayward pers. obs.). The manufacture of the mouldings and the process of adding plaster and paint need to be examined. A series of thin-sections of these early mortars and concretes should be undertaken to explore the differences in the manufacture of these innovative fabrics.
- Hand specimen analysis of the mortar types has shown how important these rather than the bricks themselves are at subdividing the structural sequence at NMI 09.
- Further work needs to be undertaken on the use of materials by the navy from the Chatham area – yellow London stock bricks and different innovative concretes not only in London but at other dockyard sites e.g. Portsmouth and Plymouth.
- The use of firebricks in the heating of these early swimming pools needs to be looked at. Whether one manufacturer was responsible for this exclusive part of the market
- The examination of other naval cemeteries to see whether certain stone materials e.g. Portland limestone was in use for grave markers.
- A number of these studies could be incorporated into a publication at NMI 09 or as separate stand alone reports in scientific or Industrial Archaeological Journals.

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APPENDIX 5: GLASS ASSESSMENT

By Chris Jarrett

Two fragments of glass were recovered from the excavation and both come from one context [140], Phase 6. The earliest vessel is the base of an upright cylindrical wine bottle with a deep kick in a dark green glass and dates to the late 18th century to the start of the 19th century. The second vessel is complete and so indicates that it was discarded soon after it was no longer required. It is in the form of a clear glass flat bottle with a deep collared rim with rectangular, rounded top panels found on the widest sides. Its function was probably for a medicine but it could also have been used to contain a cleaning product. It was machine moulded and dates from c.1827 onwards.

The glass assemblage has the no significance and its only potential is to date the contexts it was found in. None of the vessels require illustration. There are no recommendations for further work.

APPENDIX 6: COFFIN FITTINGS ASSESSMENT

By Märit Gaimster

Coffin fittings were retrieved from all twelve excavated burials and, with the exception of Grave [280], associated with individual bodies in graves with multiple interments. All coffin fittings and other finds associated with the burials are listed in Table 1. Finds range from burials with only a handful of coffin nails (Graves [280] and [296]) to those with remnants of fairly complete sets of fittings, including breastplate, coffin grips and numerous upholstery pins. The two burials with the largest amount of coffin furniture also included traces of a shroud in the form of copper-alloy shroud pins (Grave [244], Skeleton [243] and Grave [287]). The finds correlate well with previously excavated burials from the Greenwich Royal Hospital, reflecting relatively simple burials during a period otherwise, and depending on money and social status, characterised by ostentatious funerary displays (Boston et al. 2008, 71-3, 128-38).

The identified coffin fittings comprise embossed breastplate, coffin grips with embossed grip plates, coffin nails and upholstery pins. Other elements of funerary decoration in the late 18th and early 19th centuries such as embossed escutcheons, used to decorate the lid and sides of the coffin, may have been present. Much of the remains were highly corroded, fragmented and concreted onto soil and pebbles, but it is likely that most of the fragments of embossed metal sheet originate from grip- and breastplate. All fittings appear to be of iron, the cheapest material available at the time, with tin-coated iron sheet for the embossed plate (Budd 1993, 148). However, on some coffins the iron upholstery pins were coated with a clear black laquer and one also had coffin grips with the same finish (burials in Grave [230] and [250]; cf. Reeves and Adams 1993, 86). Upholstery pins were used to secure the textile covering on the outside of the coffin, but were frequently employed as additional decoration both in rows and in complex patterns (Reeves and Adams 1993, 86). Several examples of strips of coffin with *in-situ* rows of upholstery pins are among the finds (notably Grave [250], Skeleton [291]); such rows, single or double, were often applied along the margins of lids and side panels, and to divide surfaces into smaller panels. Numerous other designs and patterns are also known; among the Greenwich finds were also clusters of *in-situ* upholstery pins, with several in the shape of a rosette (both burials in Grave [230]). The heavily corroded and concreted state of many of the finds make it difficult to appreciate the number of upholstery pins associated with individual coffins, but an example of a burial with a large amount is Coffin [254] in Grave [244], with 37 pins from the head area, five from the foot and nearly 2kg of concreted fragments that mostly appear to be upholstery pins. Among previously excavated burials at the Greenwich cemetery, one yielded more than 500 upholstery pins (Boston et al. 2008, 72).

Breastplates were present in many of the burials, but mostly in the form of very fragmented pieces of embossed iron sheet. The most substantial remnants came from Skeleton [228] in Grave [230], which suggest a trapezoid coffin plate with foliage designs and a central oval panel framed by an embossed ring chain. Some pieces show ribbed decoration or possibly lettering. This breastplate may be compared with Christ Church Spitalfield's (CCS) Type 3, dated to 1810–21 (Reeves and Adams 1993, 145). Coffin grips were also present, in varying numbers, in eight of the twelve burials. Four burials included two grips, one had three, one four and two burials had five coffin grips. Of a total of 25 grips, 16 were simple rod-type drop handles of CCS Type 2a; the remaining nine were concreted onto soil and pebbles and could not be identified. This type of coffin grip has a fairly long life span; at CCS they dated from the period 1763–1837 (Reeves and Adams 1993, 144). Among the previously recovered grips from the Greenwich cemetery, identified handles were broadly of three different types, including also more substantial handles of CCS types 1 and 3b (Boston et al. 2008, 73). All except two of the current Greenwich grips had embossed grip plates still attached, usually too fragmented to allow any further comparisons. The grip plates from the two burials in Grave [233], however, were embossed with a central oval panel framed by a ring chain, similar to the design on the breastplate in Grave [230] above. A similar design is CCS Type 26, dated to 1819 (Reeves and Adams 1993, 145).

Four burials contained evidence of shrouds, both in the form of copper-alloy pins and in the form of small copper-alloy rings, possibly used as an alternative way to tie the shroud. Shrouds were backless garments with sleeves, purpose-made for the funeral, and could be fastened with ties or pins (cf. Janaway 1998, 26-31). In Grave [244], two copper-alloy shroud pins were found with Skeleton [243]; one on the right side of the skull (sf 4) and the other by the left hand (sf <5>). In positions that suggest a similar function, Skeleton [252] in the same burial had a small copper-alloy ring (sf <2>) by the waist and another (sf <3>) by the right wrist. A small copper-alloy ring (sf <1>) was also found in Grave [233], where it was recorded on the left wrist of skeleton [238]. In Grave [287], a copper-alloy shroud pin was found near the head of the body (sf <7>); a further pin was also retrieved from the grave fill (sf <8>).

Two further objects were retrieved from the burials, but it's unclear whether these were part of the burial or funerary ritual. A copper-alloy lace-chape (sf <6>) from Grave [244] represents a dress accessory more characteristic of the medieval and early modern periods. Used to prevent the end of laces from fraying, and to facilitate the fashionable laced-up clothing, these little metal points became particularly popular in the 16th century (Margeson 1993, 22). The lace-chape from Grave [44] was fastened by way of a small transverse rivet at the top end; this type of lace-chape is thought to date mainly from the 15th century, although some finds of 16th/17th-century date are also known (Oakley 1979, 262-3). This suggests the lace-chape is residual in the grave fill. The burial of Skeleton [291] in Grave [250], finally, included what

looks like a worn horseshoe; again, this object may be most likely to have ended up as a redeposited object in the grave fill.

Recommendations

The coffin fittings and other burial furniture should be included in any further publication of this portion of the Greenwich Royal Hospital cemetery, to conform with the previously published excavations. For the purpose of a full report of the findings, nine heavily concreted coffin grips from Graves [230], [233], [250] and [287] should be x-rayed to enable type identification. For the same purpose, the probable horseshoe from interment [291] in Grave [250] should also be x-rayed. After full publication, the majority of corroded and concreted coffin furniture may be reburied with the human remains; the copper-alloy objects and a selection of representative coffin grips and other fittings should be deposited with the Museum of London with the rest of the site archive.

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GRAVE 230						
Skeleton 229						
coffin	grave fill	breastplates	grips	coffin nails	upholstery pins	shrouds or artefacts
-	228	eight substantial pieces of ?trapezoid	two complete iron coffin grips with	x 3	two strips of coffin wood with	-

		coffin breast plate; oval centre framed with band of ring chain; one corner with foliage design present; two pieces of central design with ribbed decoration/ ?lettering; x-ray	embossed grip plate; W 110mm; incomplete iron coffin grip with grip plate; all concreted onto soil and pebbles; x-ray		iron upholstery pins and three further clusters of pins piece of coffin wood with seven in-situ upholstery pins in the shape of a rosette; traces of clear black coating	
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Skeleton 241

-	240	three pieces of embossed coffin/grip plate	coffin grip with embossed grip plate; complete but concreted onto soil and pebbles; W 110mm; x-ray incomplete iron coffin grip with grip plate; concreted onto soil and pebbles; x-ray	x 1	five pieces of coffin wood with in-situ clusters of iron upholstery pins; three in the shape of rosettes of seven pins; clear black coating visible	-
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GRAVE 233

Skeleton 232

coffin	grave fill	breastplates	grips	coffin nails	upholstery pins	shrouds or artefacts
238	231	numerous fragments of embossed coffin plate, some with textile adhering; wt 372g numerous fragments of coffin fittings concreted unto soil and pebbles, including coffin nails, upholstery pins and embossed coffin plate; wt 2520g	two iron coffin grips with embossed grip plate; possibly complete but concreted onto soil and pebbles; from sides of coffin; grip plates embossed with oval design; x-ray incomplete Type 2a iron coffin grip with grip plate embossed with oval design	present	handful	sf <1>: small copper-alloy ring; heavily corroded; diam. c.10mm; found on left wrist; x-ray

Skeleton 246

255	245	numerous larger and smaller pieces of embossed coffin breastplate; wt 1858g	two iron Type 2a coffin grips with embossed grip plate; complete but concreted onto soil and pebbles; W 105mm; grip plates embossed with oval design	dozen	x 4	handful of pieces of ?resin from inside coffin
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GRAVE 244

Skeleton 243

coffin	grave fill	breastplates	grips	coffin nails	upholstery pins	shrouds or artefacts
254	242	numerous small fragments of embossed coffin breast plate; wt 386g; on chest of skeleton	complete Type 2a iron coffin grip with embossed grip plate; W 130mm; from head of coffin complete Type 2a iron coffin grip with	x 4 from head of coffin x 5 from foot area	x 37 from head of coffin x 5 from foot area numerous fragments of	sf <6>: copper-alloy lace-shape; Oakley Type 1; L40mm sf <4>: copper-alloy shroud pin; L 35mm; found on

		handful of fragments of coffin fittings concreted onto soil and pebbles, including coffin nails, upholstery pins and embossed coffin plate; wt 36g	embossed grip plate; W 115mm; from right knee area incomplete Type 2a iron coffin grip with embossed grip plate; from foot area two complete Type 2a iron coffin grips concreted onto soil and pebbles; no traces of grip plate present; W 115mm		coffin fittings concreted onto soil and pebbles, comprising mostly upholstery pins with some coffin nails; wt 1874g	right side of skull sf <5>: copper-alloy shroud pin; L 24mm; found by left hand of skeleton
Skeleton 252						
253	-	handful of fragments of embossed coffin plate; wt 176 g numerous fragments of coffin fittings concreted onto soil and pebbles; including clusters of upholstery pins and pieces of embossed coffin plate; wt 4922g	two incomplete Type 2a iron coffin grips concreted onto soil and pebbles	-	present	sf <2>: small copper-alloy ring; diam.9mm; found near sternum of skeleton sf <3>: small copper-alloy ring; diam.8mm; found at right wrist of skeleton
GRAVE 250						
Skeleton 248						
coffin	grave fill	breastplates	grips	coffin nails	upholstery pins	shrouds or artefacts
249	-	-	two iron coffin grips with embossed grip plate; complete but concreted onto soil and pebbles; W 105mm; x-ray incomplete iron Type 2a coffin grip with embossed grip plate; concreted onto soil and pebbles incomplete Type 2a iron coffin grip with clear black coating	present	dozen fragments of coffin fittings concreted onto soil and pebbles, comprising mostly upholstery pins with some nails and embossed coffin plate; wt 108g; some upholstery pins showing clear black coating	-
Skeleton 282						
-	281	two fragments of embossed coffin plate dozen pieces of coffin fittings concreted onto soil and pebbles; including embossed coffin plate and coffin nails; wt 126g	-	x 2	five strips of coffin wood with iron upholstery pins, all with clear black coating	-
Skeleton 291						
-	290	four pieces of embossed coffin plate	-	handful	25 strips of coffin wood with in-situ iron upholstery pins, some with clear black coating; L	iron ?horseshoe; complete but heavily worn; W 105mm; L 100mm; x-ray

					of strips 40-250mm	
					four pieces of coffin wood with clusters of in-situ iron upholstery pins, heavily concreted but with clear black coating visible	

GRAVE 280						
Skeleton 279						
coffin	grave fill	breastplates	grips	coffin nails	upholstery pins	shrouds or artefacts
-	289	-	-	x 4	-	-
GRAVE 287						
Skeleton 285						
coffin	grave fill	breastplates	grips	coffin nails	upholstery pins	shrouds or artefacts
286	284	<p>numerous small pieces of embossed coffin breastplate; wt 398g</p> <p>dozen pieces of coffin fittings concreted onto soil and pebbles; wt 118g</p>	<p>complete Type 2a iron coffin grip with embossed grip plate; W 90mm; from right shoulder of coffin</p> <p>incomplete iron coffin grip with embossed grip plate; from left shoulder of coffin; x-ray</p> <p>incomplete Type 2a iron coffin grip with embossed grip plate;; from right knee area of coffin</p> <p>incomplete Type 2a iron coffin grip with embossed grip plate; from head end of coffin</p> <p>complete Type 2a iron coffin grip with embossed grip plate; W 115mm</p>	<p>x 4; from right shoulder of coffin</p> <p>x 4; from right knee area of coffin</p> <p>x 2; from head end of coffin</p>	<p>small cluster of three; from chest of body</p> <p>x 4; from right shoulder of coffin</p> <p>cluster of nine; from left shoulder of coffin</p> <p>x 9 and two small clusters; from right knee area of coffin</p> <p>x 29; from head end of coffin</p> <p>numerous fragments of coffin fittings concreted onto soil and pebbles; probably mostly iron upholstery pins; wt 1700g</p>	<p>sf <7>: copper-alloy shroud pin; incomplete; L 20mm+; found near head of skeleton</p> <p>sf <8>: copper-alloy shroud pin; incomplete; L 20mm+</p>
GRAVE 296						
Skeleton 295						
coffin	grave fill	breastplates	grips	coffin nails	upholstery pins	shrouds or artefacts
-	294	-	-	dozen	-	-

Table 1: Coffin fittings present in each grave

APPENDIX 7: NON-FUNERARY METAL FINDS ASSESSMENT

By Märit Gaimster

Three iron objects were recovered from contexts other than the Royal Hospital cemetery; they are listed in the table below. An incomplete nail came from Phase 5B posthole [201], while the medieval Phase 2 fire pit [226] produced part of an iron strap or fitting (sf 9) and a substantial iron bracing or structural fitting (sf 10). The two latter finds were also associated with pottery dating from 1170-1350. Numerous iron staples are known from medieval contexts, where they were usually employed in timber works; depending on their size, they were used either to bind pieces of wood together, or to fix fittings such as hasps, chains or handles in their place (Ottaway and Rogers 2002, 2830; Margeson 1993, 143-5). In the case of stone buildings, still largely the domain of the church and the wealthy throughout most of the Middle Ages, iron clamps were used to hold masonry blocks together (cf. Goodall 2000, 145-6). The Greenwich object, however, is far larger than these types of fittings, and it is unclear what function the outward-turned tips of the arms would have had. The substantial size of this object is also unusual for the period suggested by the pottery date, and it is possible that it is intrusive in the context.

Recommendations

The two metal finds from the medieval Phase 2 should be included in any further publication of the site. For this purpose, the iron strap fitting (sf 9) will require x-ray for further identification. The substantial iron structural fitting (sf 10) will also need further identification, and relevant parallels need to be established. The incomplete 19th-century nail may be discarded.

References

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Phase 2: medieval			
context	sf	description	recommendation
225	9	iron flat-section strap/fitting; incomplete; W 10mm; L 110mm; fill of fire pit [226]	x-ray
	10	substantial bracing or other structural fitting of a flat iron band with tip of arms angled outwards; W c.270mm; L of arms 150mm; fill of fire pit [226]	further identification
Phase 5B: 1833			
context	sf	description	recommendation
200		iron nail; incomplete; fill of posthole [201]	discard

APPENDIX 8: HUMAN BONE ASSESSMENT

By James Young Langthorne

The following report details the results of an assessment of the human remains from 17 inhumation burials and the disarticulated bone from 3 contexts from the National Maritime Museum in Greenwich, NMI09.

The age ranges used in this assessment are as follows;

Young Adult	20 – 35 years
Middle Adult	35 – 50 years
Old Adult	50+ years
Adult	20+ years

Inhumations

The table below summarises the data collected during the assessment of the articulated skeletal material:

Context no.	Completeness (%)	Condition	Age	Sex	Pathology/Other Comments	Phase (Prov.)
229	85	Good	Young adult	Female	A-M tooth loss. Possible pipe facets. Rickets?	4
232	70	Moderate	Old Adult	Male?	A-M tooth and facet loss resulting in remodelling of mandibula. Traces of osteophytic lipping and Schmorls nodes on vertebrae	4
241	60	Moderate-Poor	Old Adults	Male?	Two skeletons - very similar dimensions and highly fragmented mean that it is impossible to separate them into individuals. Both are partially edontulous. Surviving	4

					vertebrae show traces of osteophytic lipping and Schmorls nodes.	
243	90	Good	Old Adult	Male	A-M tooth loss and sealed sockets on left and right sides of mandible. Osteophytic lipping on vertebral bodies.	4
246	80	Moderate-Good	Old Adult	Male	Vertebrae: osteophytosis including fusion of 3 thoracic vertebrae and Schmorls nodes. Some ossification of cartilage seen on ribs ends (esp. first rib. Osteoarthritis visible on right scapula acromion. Left and right mandible partially edontulous.	4
248	70	Good	Mid-Old Adult	Male	Traces of osteophytic lipping and Schmorls nodes on vertebrae. Some A-M tooth loss in mandible. Left Tibia and fibula fused probably due to trauma- ossified haemoatoma-perhaps as a result of fracture or crush injury. Requires X-ray.	4

252	70	Good	Mid Adult	Male?	Schmorls nodes. Edontulous left and right sides of mandible.	4
279	65	Moderate-Poor	Adult	?	Highly fragmented. Osteophytic lipping on vertebrae.	4
282	90	Good	Mid Adult	Male	A-M tooth loss/socket resorption. Schmorls nodes on vertebrae	4
285	70	Good	Mid Adult	Female	A-M tooth loss/socket resorption. Schmorls nodes on vertebrae. Ossification of cartilage on ribs.	4
288	60	Moderate-Poor	Mid Adult?	?	Highly fragmented. Healed lamellar bone on lower limbs (esp. femora)	4
291	60	Moderate	Old Adult	?	Fragmentary.	4
293	70	Moderate-Poor	Adult	Male?	N/A	4
295	c. 50	Moderate-Good	Adult	At least 2 males	The heavily truncated remains of three individuals. The lower limbs can be separated into individuals but the upper torso or torsos cannot be assigned to specific individuals principally due to those elements being fairly heavily fragmented. Traces of lamellar bone on the right femur of one individual.	4

Demography

Completeness

The completeness of each skeleton was given as a percentage calculated from a complete skeleton as follows:

- Skull 20%
- Torso 40%
- Arms 20%
- Legs 20%

All the individuals recovered during the excavation were attributed to the same phase: 4.

Completeness	<25%	<50%	<75%	>75%
No. of burials (% of assemblage)	0 (0.00%)	3 (17.65%)	10 (58.82%)	4 (23.53%)

The majority of burials had 75% or less of the skeleton remaining which demonstrates the excellent preservation of the assemblage which in turn indicates excellent opportunities for further study of metrical and non-metrical traits during a potential full analysis of the inhumations.

Age and Sex

The initial assessment of the age range of the assemblage for each phase gave the following results:

Age	Early Juvenile	Mid Juvenile	Adolescent	Young Adult	Mid Adult	Mature Adult	Unspecified Juvenile	Unspecified Adult
No. of burials (% of assemblage)	0 (0.0%)	0 (0.0%)	0 (0.00%)	1 (5.88%)	5 (29.41%)	6 (35.30%)	0 (0.00%)	5 (29.41%)

The entire assemblage was composed of adult individuals with the majority older than 35 years of age (Mid-Old Adult). Only 1 young adult made up the remaining fraction of the inhumations.

All of the individuals disinterred during the excavation were adults and therefore exhibited sexually dimorphic characteristics; an assessment of which gave the following results:

Sex	Male	Female	Indeterminate
No. of burials (% of assemblage)	11 (64.71%)	2 (11.76%)	4 (23.53%)

A strong male bias was evident within the assemblage.

Pathology

Pathologies such as joint and dental disease were observed throughout the group, as would be expected of most assemblages and particularly with an elderly population such as this. Particularly notable were the possible pipe facets noted in skeleton [229] and the ossified haematomata which fused the left tibia and fibula of skeleton [248] together.

Disarticulated bone

Disarticulated human bone was recovered from 3 contexts, the largest quantity of which came from context [236], the fill of a charnel pit, with c. 237 fragments of bone present which constituted a minimum number of 5 individuals. The remaining disarticulated bone was from grave soil layer [170] which contained 4 fragments of bone; an MNI of 1 individual and badly truncated grave fill [294] which contained 133 fragments constituting a mixture of scrambled remains of the 3 individuals that constitute [295] and charnel material. The condition of the bone throughout the contexts ranged from good to poor. Those fragments that could be allocated to an age group were all adults or probable adults. Only 4 specimens from the disarticulated remains, 2 of the skulls from context [236] and skeletal elements from [294] could be allotted a sex: male. Particularly notable pathological conditions encountered within the disarticulated material included fragments of a skull which exhibited potential Paget's disease and a proximal foot phalanx with gout from charnel pit fill [236] as well as a case of DISH (Diffuse Idiopathic Skeletal Hyperostosis) from disturbed grave fill [294].

Context no.	Skeletal Element	No. of fragments	Condition	MNI for each context	Sex	Age	Phase (prov.)
170	Right humerus	1	Good	1	?	Adult	4
170	Left humerus	1	Moderate-Good	1	?	Adult	4
170	Rib shaft	1	Moderate	1	?	Adult?	4
170	IV Metatarsal	1	Good	1	?	Adult?	4
236	Skull fragments (One skull exhibits possible Pagets Disease)	26	Good-moderate	5	Male	Adult	4
236	Mandibles	3	Good	5	Male	Adult	4
236	Left and Right Clavicles	7	Good	5	?	Adult	4
236	Cervical Vertabrae	5	Good	5	?	Adult	4
236	Thoracic Vertebrae (Traces of osteophytic lipping and Schmorls nodes)	7	Good-moderate	5	?	Adult	4
236	Lumbar Vertebrae (osteophytic lipping on articular facets and bodies. Schmorls nodes and calcification of ligament on transverse process)	7	Good	5	?	Adult	4
236	Left Ribs	7	Good	5	?	Adult	4
236	Right Ribs (Traces of soft tissue calcification on one shaft)	10	Good-moderate	5	?	Adult	4
236	Unsided Rib fragments	13	Moderate	5	?	Adult	4
236	Manubrium	1	Good	5	?	Adult	4
236	Sacrum fragments	2	Poor	5	?	Adult	4
236	Pelvis fragments	13	Poor	5	?	Adult	4
236	Left Humerus	3	Moderate	5	?	Adult	4
236	Right Humerus	4	Good-moderate	5	?	Adult	4
236	Unsided Humerus fragments	2	Poor	5	?	?	4
236	Right Ulna	1	Good	5	?	Adult?	4
236	Left Ulna	1	Good	5	?	Adult	4

236	Unsided Ulna shaft fragments (one exhibits traits of non-specific infection-osteomyelitis?)	2	Moderate	5	?	?	4
236	Right Radius	1	Good	5	?	Adult	4
236	Left Radius	1	Good	5	?	Adult	4
236	Right Femur	4	Good-moderate	5	?	Adult	4
236	Left Femur (one has traces of periostitis)	5	Good-moderate	5	?	Adult	4
236	Unsided Femur	8	Moderate	5	?	Adult	4
236	Left Tibia	2	Good-moderate	5	?	Adult	4
236	Right Tibia	2	Good-moderate	5	?	Adult	4
236	Unsided Tibia fragments (shaft exhibits possible healed fracture and infection - osteomyelitis?)	2	Moderate	5	?	Adult	4
236	Left Fibula	1	Good	5	?	Adult	4
236	Unsided Fibula fragments	10	Moderate-Poor	5	?	Adult?	4
236	Capitate	1	Good	5	?	?	4
236	Distal hand phalanges	3	Moderate-Poor	5	?	?	4
236	Left Calcaneus	1	Poor	5	?	?	4
236	Right Calcaneus	1	Poor	5	?	?	4
236	Unsided Calcaneus fragment	1	Poor	5	?	?	4
236	Left Talus	2	Good	5	?	Adult?	4
236	Right Talus	2	Good	5	?	Adult?	4
236	Cuboid	1	Moderate	5	?	?	4
236	Right Cunieforms	2	Good-moderate	5	?	Adult?	4
236	Left Cunieform	1	Good	5	?	Adult?	4
236	Metatarsals (traces of osteoarthritis)	13	Good-moderate	5	?	Adult	4
236	Foot Phalanges (Possible traces of gout on 1st Proximal Phalanx head)	9	Good	5	?	Adult?	4

236	Unidentified Fragments	50	Poor	5	?	?	4
294	Rib fragments (one has a healed rib fracture)	53	Moderate	3	?	Adult?	4
294	Pelvis fragments	4	Moderate-Poor	3	Male?	?	4
294	Clavicles (Left and Right)	2	Good	3	?	Adult	4
294	Skull fragments	3	Good-moderate	3	?	?	4
294	Mandible	1	Good	3	Male?	Adult	4
294	Sternum	2	Good-moderate	3	?	Adult	4
294	Metacarpals (Osteoarthritis in 1st MC)	4	Good	3	?	Adult	4
294	Foot Phalanges	3	Good	3	?	?	4
294	Femur heads	2	Moderate	3	?	Adult	4
294	Right Humerus	2	Good-moderate	3	?	Adult	4
294	Left Humerus	6	Good-moderate	3	?	Adult	4
294	Vertebrae (traces of DISH-Diffuse Idiopathic Skeletal Hyperostosis)	20	Good-moderate	3	?	Adult	4
294	Right Ulna	1	Good	3	?	?	4
294	Unidentified Fragments	30	Poor	3	?	?	4

Recommendations for further work

The articulated remains should be fully analysed, to include full analysis of age, sex, metric data and pathologies and the subsequent report written to include the results of this analysis. The analysis should be done to the same standard as that of the previous report by Oxford Archaeology at the Royal Hospital Greenwich¹ in order to provide a supplement to that site.

The fused left tibia and fibula of skeleton [248] require an x-ray to determine the whether there is an underlying fracture present which has caused the ossified haematoma.

¹ Boston *et al* 2008

There is also an opportunity to photograph some of the more notable pathologies within the assemblage. This would include the potential pipe facets seen in skull [229], the ossified haematoma of skeleton [248] the gout and Pagets disease witnessed in disarticulated charnel material [236] and the DISH encountered on vertebrae within disturbed grave fill [294].

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APPENDIX 9: ANIMAL BONE ASSESSMENT

By Kevin Rielly

Introduction

The site, located within the grounds of the museum, consisted of a small collection of medieval cut features which predated a 16th century road (the main Deptford – Woolwich highway). This was truncated by a series of human burials, these forming a part of the Mariners cemetery. The latest features included an early 19th century brick-built wall and cellar and the foundations and crypt walls of St Mary's church built in 1824.

A small collection of poor to moderately preserved animal bones were found in one of the medieval features, from the road and also from 2 of the graves. All the bones were retrieved by hand.

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 by phase

The site provided a grand total of 20 bones from hand collection, these taken from a medieval pit (Phase 2), the 16th century road (Phase 3) and from the cemetery (Phase 4), with the majority arising from the road deposits (see Table 1).

Medieval (Phase 2)

A few bones were recovered from the fill [205] of pit [206], this dated between 1170 and 1350. This small collection was poorly preserved and highly fragmented. There were 3 identifiable bones, consisting of a metacarpal and a mandible, both from adult individuals, the mandible from a somewhat older animal, probably well in advance of 5 years. The single pig bone is a radius.

Post-medieval (Phases 3 and 4)

Most of the bones were taken from various layers making up the road (Phase 3), including [260], [262], [267] and [277]. In addition a few more were revealed by a fill [297] within the roadside ditch [298], this forming the only dated deposit, between 1550 and 1700. The bones consisted of a cattle scapula, pelvis, femur, tibia, metatarsus and 1st phalange, and a

sheep/goat femur and tibia. All were moderately preserved with the exception of the highly abraded cattle tibia, and all were clearly from adult individuals.

The Phase 4 bones were taken from graves [244] and [287], including an adult pig mandible and a sheep/goat femur respectively, the latter from a sub-adult animal.

Phase:	2	3	4
Species			
Cattle	2	6	
Cattle-size	3	2	1
Sheep/Goat		3	1
Pig	1		1
Grand Total	6	11	3

Table 1: Counts of animal bone in each occupation phase

Conclusion and recommendations for further work

Not only are the phased collections rather small, they have also suffered a moderate to high degree of fragmentation and all, and especially the medieval bones, are less than well preserved. No butchery marks were noticed and none of the bones were measurable (following the dimensions described in von den Driesch 1976). There are clearly insufficient bones to warrant any detailed comments on exploitation trends or meat redistribution, although the mix of parts from the 16th century road would suggest waste material from a variety of sources.

The generally early date of the faunal assemblage from this site is unusual for this general area, with previous collections generally dating to the 18th century, from the Queen Anne Quarter, Outer Court, as well as from Greenwich Reach and the tannery at 43-81 Greenwich High Road (Rielly 2006; 2009a; 2009b). However, the early date cannot provide sufficient impetus to necessitate any further analysis of this rather small collection.

References

Driesch, A., von den, 1976. *A guide to the measurement of animal bones from archaeological sites*, Peabody Mus Bull 1, Cambridge, Massachusetts.

Rielly, K., 2006. Assessment of the faunal remains from Queen Anne Quarter, Outer Court, Greenwich (RND05), MoLA Unpublished Assessment Report.

Rielly, K., 2009a. Assessment of animal bone recovered from Greenwich Reach, London Borough of Southwark (GQR06) PCA Unpublished Assessment Report.

Rielly, K., 2009b. Assessment of animal bone recovered from 43-81 Greenwich High Road, SE10, London Borough of Southwark (GHI08) PCA Unpublished Assessment Report.

APPENDIX 10: OASIS FORM

1.7 OASIS ID: preconst1-77399

Project details

Project name	National Maritime Museum, Sammy Ofer Wing, London Borough of Greenwich, SE4
Short description of the project	Natural sandy gravels were cut by 2 medieval pits and a boundary ditch. A section of the main Deptford - Woolwich highway, dating back to at least the 16th century was observed running east-west to the north of the site. The edge of this was truncated by burials associated with The Mariners Cemetery. In total 17 inhumations were recorded in 7 grave cuts, with each holding 2-3 bodies. A brick built boundary wall and cellar dated to c.1800 were located in the north-east of the site. The wall separated Greenwich Park in the south from the Queen's House, to the north. To the west of the site, in the present day King William Garden foundations the crypt walls of St Mary's Church, (built in 1824), were recorded. Within the crypt the tops of nine lead coffins were observed in the base of a pipe trench. In the central and eastern areas of the site a swimming pool, initially constructed in 1833 was observed. Evidence of two alterations to the pool were revealed. Both the pool and St Mary's Church were demolished in 1936, the demolition layers of which, along with the subsequent landscaping were recorded.
Project dates	Start: 12-11-2009 End: 17-02-2011
Previous/future work	Yes / No
Any associated project reference codes	NMI 09 - Sitecode
Type of project	Recording project
Site status	World Heritage Site
Current Land use	Vacant Land 1 - Vacant land previously developed
Monument type	PITS Medieval

Monument type	DITCHES Medieval
Monument type	ROAD Post Medieval
Monument type	CEMETERY Post Medieval
Monument type	SWIMMING POOL Post Medieval
Monument type	CHURCH Post Medieval
Monument type	BOUNDARY WALL Post Medieval
Monument type	CELLAR Post Medieval
Significant Finds	POT Medieval
Significant Finds	COFFIN FURNITURE Post Medieval
Significant Finds	HUMAN BONE Post Medieval
Investigation type	'Part Excavation','Watching Brief'
Prompt	Planning condition

Project location

Country	England
Site location	GREATER LONDON GREENWICH GREENWICH National Maritime Museum, Sammy Ofer Wing
Postcode	SE10 9XX
Study area	7000.00 Square metres
Site coordinates	TQ 3858 7758 51.4796734725 -0.00414089783337 51 28 46 N 000 00 14 W Point
Lat/Long Datum	Unknown
Height OD / Depth	Min: 8.53m Max: 9.79m

Project creators

Name of Organisation	Pre-Construct Archaeology Ltd
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Project brief originator Pre-Construct Archaeology Ltd

Project design originator Tim Bradley

Project director/manager Tim Bradley

Project supervisor Guy Seddon

Type of sponsor/funding body National Museum

Name of sponsor/funding body National Maritime Museum

Project archives

Physical Archive recipient LAARC

Physical Contents 'Ceramics','Human Bones','Metal'

Digital Archive recipient LAARC

Digital Contents 'Ceramics','Human Bones','Metal','Stratigraphic','Survey'

Digital Media available 'Images raster / digital photography','Spreadsheets','Survey','Text'

Paper Archive recipient LAARC

Paper Contents 'Stratigraphic'

Paper Media available 'Context sheet','Diary','Drawing','Matrices','Photograph','Plan','Report','Section'

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Archaeological Investigations at National Maritime Museum, Sammy Ofer Wing, London SE4, London Borough of Greenwich
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