

The Royal Arsenal
Woolwich
Building 22 Car Park
Zone 10



**Archaeological Observation and
Recording**



Oxford Archaeology

December 2004



**Client: Berkeley Homes
(East Thames) Ltd**

Issue N^o: 1

OA Job N^o: 2261

NGR: TQ 440 792

Client Name: Berkeley Homes (East Thames) Ltd.

Client Ref No:

Document Title: The Royal Arsenal, Woolwich, Building 22 Car Park.
Zone 10. Archaeological Observation and Recording

Document Type: Archaeological Investigation Report

Issue Number: 1

National Grid Reference: TQ 440 792

Planning Reference: 02/2902/F

OA Job Number: 2261

Site Code: RYA 99

Invoice Code: WOLBK WB5

Receiving Museum:

Museum Accession No:

Prepared by: Ryan Whalley
Position: Supervisor
Date: 2nd December 2004

Checked by: David Score
Position: Project Manager
Date: 10th December 2004

Approved by: Nick Shepherd
Position: Head of Fieldwork
Date: 20th December 2004

Signed.....



Document File Location Server
1:/PROJECTS/RYA99/BerkeleyHomes/Arsenal/B.22Car
Park WOLBK WB5/WOLBKWB5 Report
Graphics File Location As illustration tag
Illustrated by Julia Moxham

Disclaimer:

This document has been prepared for the titled project or named part thereof and should not be relied upon or used for any other project without an independent check being carried out as to its suitability and prior written authority of Oxford Archaeology being obtained. Oxford Archaeology accepts no responsibility or liability for the consequences of this document being used for a purpose other than the purposes for which it was commissioned. Any person/party using or relying on the document for such other purposes agrees, and will by such use or reliance be taken to confirm their agreement to indemnify Oxford Archaeology for all loss or damage resulting therefrom. Oxford Archaeology accepts no responsibility or liability for this document to any party other than the person/party by whom it was commissioned.

Oxford Archaeology

© Oxford Archaeological Unit Ltd 2004

Janus House

Osney Mead

Oxford OX2 0ES

t: (0044) 01865 263800

f: (0044) 01865 793496

e: info@oxfordarch.co.uk

w: www.oxfordarch.co.uk

Oxford Archaeological Unit Limited is a Registered Charity No: 285627

Berkeley Homes (East Thames) Ltd.**The Royal Arsenal, Woolwich
Building 22 Car Park (Zone 10)
AA 610****NGR TQ 440 792*****ARCHAEOLOGICAL OBSERVATION AND RECORDING*****CONTENTS**

Summary.....	1
1 Introduction	1
1.1 Location and scope of work	1
1.2 Geology and topography.....	1
2 Archaeological and Historical Background.....	2
2.1 General	2
2.2 Past archaeological investigations.....	2
3 Project Aims	3
3.1 General research aims for the Royal Arsenal.....	3
3.2 Specific aims	5
4 Methodology.....	6
5 Results	6
5.1 Description of deposits	6
5.2 Archaeological features.....	8
5.3 Finds	10
5.4 Palaeo-environmental remains	11
6 Discussion and Conclusions	11
7 Appendix 1 Archaeological Context Inventory	13
8 Appendix 2 Bibliography and references	15
9 Appendix 3 GLSMR/RCHME NMR Archaeological Report Form	16

LIST OF FIGURES

- Fig. 1 Site location
Fig. 2 Site plan
Fig. 3 Sections 1162 and 1163
Fig. 3 Sections 1164 and 1165

SUMMARY

From June to September 2004 Oxford Archaeology (OA) carried out archaeological Observation and Recording at The Royal Arsenal, Woolwich (Zone 10) on excavations for a semi-basemented car park to serve Building 22.

Gravel deposits thought to be part of the natural terrace were observed in the south west of the area and appear to confirm the previously postulated line for the edge of this feature. The works revealed natural alluvial silts relating to the pre-existing marshes in only a small area of deeper excavation. On the remainder of the site excavation did not penetrate below the overlying layers of post-medieval made ground that were the result of an historical land reclamation process. Several brick walls and concrete foundations were cut through this made ground. The orientation and alignment of the structures suggests that they were contemporary with or additions to the 19th century Shot and Shell Factory (Building 24) which previously stood on the site. Several ancillary iron, brick and concrete structures were revealed which were probably contemporary with Building 24. The entire site had been truncated as part of a modern remediation process and capped by modern made ground.

1 INTRODUCTION

1.1 Location and scope of work

- 1.1.1 From June to September 2004 Oxford Archaeology (OA) carried out archaeological Observation and Recording at The Royal Arsenal, Woolwich, Zone 10 (NGR TQ 440 792). The work was commissioned by Berkeley Homes (East Thames) in respect of a planning application for a semi-basemented car park to the east of Building 22 (Planning Ref. 2/2902/F).
- 1.1.2 The car park was constructed on the western half of the area formally occupied by the Shot and Shell Factory (Building 24) and is situated to the north, east and south of the extant Gatehouse (Building 23) in Zone 10.
- 1.1.3 The archaeological work was carried out in accordance with a Written Scheme of Investigation agreed with Mark Stevenson of English Heritage.

1.2 Geology and topography

- 1.2.1 The western part of the surviving arsenal, known as Royal Arsenal - West, and the town of Woolwich, lie on a promontory of high ground which slopes gently down from the south to meet the Thames. This promontory gave way to two low-lying areas of marshland, Greenwich Marshes to the west, and the Plumstead Marshes to the east.
- 1.2.2 Zone 10 lies on the edge of the former Plumstead / Erith Marshes to the east and the natural gravel promontory to the west. In this inter-tidal marsh area, peat and alluvial

deposits accumulated and overlie the gravel and chalk deposits. This low-lying ground has been reclaimed, firstly by the building of substantial river walls from the medieval period onwards, and latterly by substantially raising the former ground levels, to allow expansion eastwards of the military complex from the late 18th century onwards.

2 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 General

- 2.1.1 The general background to the Arsenal has been well established in a series of reports, RCHME, 1994; Mills Whipp, 1995; OA February 2004, OA February 2002, OAU, 1999; Broadway Malyan, 2000, but a brief summary of the specific historical and archaeological background to the Building 22 Car Park development area is presented below.
- 2.1.2 During the prehistoric period this area fluctuated between marsh and mud flats. Documentary sources inform us that at least by the medieval period the land had been reclaimed behind a River Wall (lying some 140m north of the development area). In 1777 a new boundary ditch incorporated part of the area into the Arsenal, and by 1805 the entire area was part of the Arsenal lands.
- 2.1.3 Initial activity from 1808-10 included culverting existing water carrying ditches and the raising of the general ground level. An 1808 plan of the area shows a number of buildings which respect the alignment of the southern corner of Prince Rupert's Fort a large ditch and bank earthwork constructed as a platform for a gun battery overlooking the Thames in 1667. The nature of the construction of these buildings is unknown. At this time the marshes had only recently been reclaimed and buildings of a similar date in Zone 22 have been shown to have been constructed on a 'raft' of reused gun carriages. The main potential for revealing evidence of Prince Rupert's Fort and these earlier buildings is in the north west area of the proposed development.
- 2.1.4 The earliest indications of the Shot and Shell Factory appear on a plan dating from 1860-3, and are shown on a subsequent 1864 plan as the "Rifle Shot and Shell Factory". Incremental changes occurred to the Arsenal complex during the next 100 years. The Shot and Shell Factory (B.24) occupied a substantial part of both Zones 9 and 10.
- 2.1.5 Around 1930 an electricity substation was built to the south east of the development area and by this date the Shot and Shell Factory had been converted to workshops (turneries). In 1967 the ordinance factories finally closed and many of the buildings within the development area were demolished. The only extant part of the complex is the former Gatehouse (B.23).

2.2 Past archaeological investigations

- 2.2.1 Within the walled site of 'Royal Arsenal - West' a broad ranging scheme of remediation and the installation of new infrastructure was carried out by English Partnerships (EP) now the London Development Agency (LDA) during 1999 and 2000. The site was divided into saleable plots (Zones) and a network of roads, all of which were named/numbered. Much of this work was covered by Oxford Archaeological Unit (OAU) now Oxford Archaeology (OA) using a variety of archaeological responses, including Watching Brief, Evaluation, Strip and Record and Area Excavation - collectively called Archaeological Actions (AAs).
- 2.2.2 It is believed that Zones 9 and 10 were generally remediated to a depth of 1.5m b.g.l. during the infrastructure works but no archaeological mitigation strategy was in place for this area at the time of the general reduction and consequently no archaeological record was made. It is likely that only fragmentary deep remains relating to the Shot and Shell Factory will survive.
- 2.2.3 Archaeological work which was carried out on the area included general watching briefs on Zones 9 and 10 (as AA 130 and AA 129 respectively), the excavation of three evaluation trenches (AA's 52, 61 and 62), and three localised watching briefs on contamination hotspots (AA's 21, 22 and 27). These interventions are detailed within a previous report: *The Royal Arsenal, Woolwich: Phase 1 Infrastructure Works Post-Excavation Assessment* (OA Nov 2002). Further watching brief observations were made during the Berkeley Homes Phase 2 development of Zone 9 (OA April 2004).
- 2.2.4 In summary, these works recorded brick and concrete structural remains of the former Shot and Shell Factory, and of subsequent modern workshops which had in turn truncated the Shot and Shell Factory remains. Associated services and culverts were also noted.

3 PROJECT AIMS

3.1 General research aims for the Royal Arsenal

- 3.1.1 The following are general research questions to be considered in relation to all work undertaken at the Royal Arsenal site.

Prehistoric

- 3.1.2 What is the nature of the waterlogged palaeo-archaeological deposits at the inter-tidal horizon.
- 3.1.3 Is there any evidence of extra-mural occupation associated with the *oppidum*?
- 3.1.4 How did the *oppidum* relate to lower lying ground to the east, and the exploitation of riverine resources?
- 3.1.5 What was the prehistoric topography of the site?

- 3.1.6 What is the environmental context of the Iron Age *oppidum* as potentially revealed from biological evidence preserved in adjacent peat and alluvial deposits?
- 3.1.7 How does any prehistoric activity on the site relate to later Roman occupation and funerary deposits?

Roman

- 3.1.8 Is there evidence of Roman occupation contemporary with the cemetery. Is there evidence of later Roman occupation as indicated by the evidence from the upper levels of the *oppidum* ditch? If so what was its character, and does its date range coincide with that of the cemetery?
- 3.1.9 What is the environmental context of the Roman activity on the site as potentially revealed from biological evidence preserved in adjacent peat and alluvial deposits?
- 3.1.10 What was the Roman topography of the site?
- 3.1.11 What evidence is there for potential continuity or discontinuity with prehistoric activity in the area?

Saxon

- 3.1.12 The main issue to be addressed is simply whether there is any evidence of Saxon activity on or around the site.
- 3.1.13 Is there evidence for the environmental conditions for the area in the Saxon period? If so how does it compare with earlier periods?
- 3.1.14 What was the Saxon topography of the site?
- 3.1.15 Is there any evidence of continuity with Roman activity on the site, particularly in relation to any occupation activity as suggested by the Roman material from the upper levels of the *oppidum* ditch?

Medieval and post-medieval

- 3.1.16 What was the nature and extent of any medieval settlement/activity on the site and the foreshore?
- 3.1.17 Is there evidence for the environmental conditions for the area in the medieval period? If so how does it compare with earlier periods?
- 3.1.18 What was the medieval topography of the site?
- 3.1.19 What can be learned from the fabric, form and function of the various known pre-arsenal buildings and structures, notably Tower Place itself, its gardens, appurtenances, messuages, tenements, farms, mill, sugar factory, dovecote, wharfages, river defences and drainage ditches? What might be retained *in-situ* and or displayed?

- 3.1.20 What was the topography of the site and how was it altered during the transitional period?

Main Military and Industrial Development of the Arsenal

- 3.1.21 How did the topography of the site change in relation to time during the military period?
- 3.1.22 What is the potential for the excavation of building foundations to enhance our knowledge of the architecture of the arsenal buildings? What might be retained *in-situ*/displayed?
- 3.1.23 What evidence survives to illustrate the building technologies employed on the site (changes in pile technology, early use of hydraulic mortars / Portland cement / concrete, the use of cast iron columns as rainwater downpipes etc)? What can be learned from these?
- 3.1.24 If convict burials are located, what can be learned from their pathology about social conditions (prior to imprisonment) as well as the conditions on the convict hulks?
- 3.1.25 What evidence survives of the processes formerly carried out on the site? Evidence is likely to vary from stains/wear marks on floors to massive iron-lined casting pits and steam hammer foundations. What do these reveal about the cycles of war and peace, the changing technologies involved or the organisation and mechanisation of the site? What might be retained *in situ*/displayed/reinstated?
- 3.1.26 How were the road surfaces metalled at different periods? What survives and what might be retained *in-situ*/reinstated?
- 3.1.27 What survives of the various power sources (steam, gas, hydraulic, electrical), power transmission systems (below-ground drive shafts, steam, gas, hydraulic, electric, mains) and other below-ground mechanical remains (hydraulic crane and capstan bases, steam-hammer foundations etc)? What do these reveal about the technologies involved or the organisation and mechanisation of the site? What might be retained *in situ*/displayed/reinstated?

3.2 Specific aims

- 3.2.1 To identify and record the presence/absence, extent, condition, quality and date of archaeological remains in the area affected by the development.
- 3.2.2 To record any evidence relating to the previous development of the Shot and Shell Factory (B. 24) with reference to its character, layout and function and to qualify the nature and extent of the building.
- 3.2.3 To locate and record any evidence of Prince Rupert's Fort.
- 3.2.4 To locate and record any surviving evidence for buildings shown on the 1808 plan of the area which predate the Shot and Shell Factory.

3.2.5 To make available the results of the archaeological investigation.

4 METHODOLOGY

- 4.1.1 Machine excavation was archaeologically monitored for the duration of the ground works.
- 4.1.2 Where archaeological features and structures were encountered, they were recorded and photographed *in situ* using colour slide and black and white print film. A general photographic record of the work was made. Recording followed procedures detailed in the *OAU Fieldwork Manual* (ed. D Wilkinson, 1992) and the Written Scheme of Investigation. Brick samples were collected to assist in the general phasing of the site. Small finds were recorded using unique reference numbers.
- 4.1.3 All archaeological features were planned at a scale of 1:200 and sample sections of the deposits drawn at scales of 1:20.
- 4.1.4 Oxford Archaeology uses a recording system that describes each archaeological action undertaken on the Royal Arsenal site using a unique sequential number (AA Nos.). This observation and recording exercise has been numbered AA 610.

5 RESULTS

5.1 Description of deposits

- 5.1.1 The modern ground surface has an elevation of *c* 4.75 m above ordnance datum (OD). Machine excavation reduced the ground level to *c* 2.75 m OD which was exceeded in specific locations for drainage pipes and silt traps. From one of the deeper excavations it was noted that historically made ground was present from 2.67 m OD. Therefore, in the majority of the site area natural deposits were not impacted. However, in the south west part of the site evidence of the probable interface between the edge of the gravel terrace projected to cross this area and the alluvial silts and deposits associated with the Plumstead Marshes was seen. From the sample sections recorded, the following can be postulated.
- 5.1.2 Layer 15622 seen in the lower part of section 1163 (Fig. 3) consisted of light brown medium course gravel which extended from the base of the section at 2 m OD to 3.16 m OD. This layer is thought to be part of the natural gravel terrace which is projected to cross the south west corner of the site. The similarity of this deposit to the made ground layers and the conditions of a bulk excavation made it difficult to trace this layer accurately on site but it is thought to be limited to a fairly discreet area around section 1163 and did not extend much further to the east.
- 5.1.3 In support of this interpretation section 1164 (Fig. 4) recorded in a drainage trench excavated in the base of the main area to the south east of section 1163 showed a natural alluvial medium brown grey clayey silt (15626) rising to 2.47 m OD. In the deepest excavation on site which was for the car park's silt trap and tank (2 m E-W x 8 m N-S) located adjacent to section 1164 (but not recorded in detail for health and

safety reasons) the alluvial material was noted to extend to the base of the excavation at -0.43 m OD.

- 5.1.4 Overlying 15626 was a mixed and stained interface of dark brown/black clayey silt (15625) rising to 2.58 m OD. Layer 15625 was in turn overlain by a black peaty silt with a high quantity of angular gravel (15624). It is likely that this deposit is a remnant of the marsh land surface, with rich organic content mixing with the first layers of imported gravel from the historical land reclamation process and has an interface with the overlying made ground deposits at 2.67 m OD.
- 5.1.5 The relative levels of the gravel 15622 and the alluvial and marsh deposits are consistent with 15622 as a terrace sloping sharply down to the east but would not sit easily with an interpretation of it as made ground overlying marsh.
- 5.1.6 Layer 15624 was overlain by layer 15623, a light brown sand with c 50% medium course gravel interpreted as made ground. 15623 was also the number used to refer to the historic made ground in the main area of the excavation.
- 5.1.7 15623 was similar to 15621 which overlaid the probable natural gravel in Section 1163. 15621 was a medium course gravel in a dark grey sandy matrix and is also interpreted as made ground. Deposit 15621 had been truncated by the remediation works completed in 1999 at a level of 3.51 m OD. A modern teram membrane had been laid across site and indicated the extent of modern truncation. This was overlain by layers of remediation backfill deposits.
- 5.1.8 With the exception of the south west corner the sequence of a fairly uniform historic made ground overlain by remediation deposits was observed to be consistent across the site. In section 1162 (Fig. 3) at the northern limit of excavation the interface between the historic made ground gravel deposits (15607) and the overlying remediation backfill (15604-15606) was observed at 3.15 m OD whereas in the south it was recorded at 3.5 m and 4.35 m OD in sections 1163 and 1165 respectively indicating some variation in the actual levels remediated. This was probably due to the remediation process which may have been conducted to different depths for different areas but which also 'chased out' obstructions where they occurred and has created a somewhat uneven horizon.

Further differentiation near the South West corner

- 5.1.9 In north facing section 1165 (Fig. 4) located in the south-west corner of the site, further distinct gravel layers were visible within the historically made ground. Allotted contexts 15645 to 15635, these layers of deliberately laid gravel appear much more distinct. Within them are several deposits suggestive of in-situ industrial activity or secondary/tertiary residues. The earliest of these was layer 15644, at a depth of 2.94 m OD. The consistency and grey colour of this deposit may indicate an early processing area. The gravel was compacted in a manner that suggested a prepared surface.

- 5.1.10 Possible surface 15640 also exhibited a high amount of compaction and like layer 15644 was suggestive of a prepared surface. Its orange-grey discolouration may indicate high heat activities. It lay at a level of 3.60 m OD.
- 5.1.11 Layer 15637 was localised to the south-west corner of the site and lay at 3.80 m OD. The deposit was a distinctive dark red and black opaque material that appeared to be congealed measuring 100 mm in thickness. There were small gravel inclusions within this fine matrix and overall it had a waxy appearance. Its consistent thickness and level would suggest a surface possibly constructed from industrial waste material.

5.2 Archaeological features

- 5.2.1 Several brick-built walls and occasional iron and concrete features were recorded (Fig. 2).

Structure 15608

- 5.2.2 Along the eastern baulk of site, 80 m south of the northern limit, the west face of a N-S aligned wall (15608) was revealed. This wall was set in made ground (15623) and extended 16.5 m to the south. Ten courses survived comprising c19th-century pinkish-red and yellow frogged bricks set in a hard creamy-white cement mortar. The bricks measured 230 x 110 x 70 mm.

Structure 15609

- 5.2.3 In the western baulk, 32 m south of the northern edge of the site was a N-S aligned wall (15609). It was 12 m long, the south end disappeared into the baulk, but the north end revealed a westbound return exiting the baulk. This wall was set in made ground (15623). Eight courses survived, comprising c 19th-century pinkish-red and yellow frogged bricks set in a hard creamy-white cement mortar. The bricks measured 230 x 110 x 70 mm.

Structure 15612 and 15614

- 5.2.4 Along the western baulk, in alignment with, but south of Building 23, another brick wall (15612) was recorded with concrete foundations (15613). From the western baulk the wall extended 7 m east with a corner returning north for 5 m and exiting the baulk. Four courses survived, comprising c 19th-century pinkish-red and yellow frogged bricks set in a hard creamy-white cement mortar. The bricks measured 230 x 110 x 70 mm. The foundation was a creamy-grey powdery concrete, largely amorphous as if it was poured without wooden forms and is 600 mm thick. The foundation was set in made ground (15623).
- 5.2.5 Structure 15614 was a large iron box. It measured 4 m E-W x 3 m N-S with a height of 1 m and the iron plates measured 30 mm in thickness. The internal fill of this feature was a very rich organic black loam. The alignment of this feature with structure 15612 indicates that they may have been related. The use of this feature is

unknown, but probably it was an industrial holding tank. This tank was set in made ground (15623).

Feature 15629 and Structure 15628

- 5.2.6 Feature 15629 was an E-W aligned linear measuring 38 m long and 1.5 m wide. It truncated a N-S aligned wall (15627) and could itself be a robber trench associated with a similar wall or more probably a trench for a drain serving the Shot and Shell Factory.
- 5.2.7 An iron cylinder (15628) encased in creamy-grey concrete partially cut the fill of 15629 and the made ground 15623. The cylinder measured 850 mm in diameter and was 1.2 m in height. It was encased in a 300 mm thick layer of concrete and was *in situ*, upright, with a ring of corroded iron visible on the top surface, suggesting there had been a structure attached at some time. This could be a base for a free standing hollow cylindrical iron structure or support.

Structure 15647

- 5.2.8 Structure 15647 was an oval, brick-built drain on a NE-SW alignment. It was 5 m long extending out of the southern baulk of the site. The north end terminated in a 1 m square brick-built access or man hole. The bricks were pinkish-red and yellow in colour and set in a grey mortar with large white flecks. The bricks measured 230 x 110 x 70 mm. A sample of the brick was collected (no.2587). This structure was set in made ground (15623).

Structures 15627, 15646, 15648, 15649 and 15650

- 5.2.9 This group of structures was a series of related walls and industrial pads located in the south-east corner of the site.
- 5.2.10 N-S aligned wall 15627 was situated 6.5 m west of the eastern baulk and formed a return for the E-W aligned wall 15646. Measuring 10 m long 15627 was truncated by a probable service trench (15629). Of the brickwork, three courses survived, comprising c 19th-century pinkish-red and yellow frogged bricks set in a hard creamy-white cement mortar. The bricks measured 230 x 110 x 70 mm. The bricks were set on a foundation of creamy-grey powdery concrete, measuring 850 mm in thickness. The foundations were straight and some small bits of wood from their forms survived. The foundation was set in made ground (15623).
- 5.2.11 A major E-W aligned wall (15646) with a concrete base was recorded extending 37 m across site. Truncated by the 1999 remediation to the west, this wall extended out of the eastern baulk. Starting from the bottom course, the brick work was 3 courses high overlain by 2 courses with a 50 mm offset in turn followed by 1 course with a 50 mm offset. Above the single course were 5 courses, again offset, survived of the wall proper. The wall width was 1.38 m wide and was constructed of c 19th-century pinkish-red and yellow frogged bricks set in a hard creamy-white cement mortar. The bricks measured 230 x 110 x 70 mm. A sample of the brick work was collected

(no.2586). The foundation was a creamy-grey powdery concrete with straight sides and some small bits of wood from their forms surviving. The foundation was set in made ground (15623). Returns along the eastern half of this wall headed north (15627) and south (15648).

- 5.2.12 The N-S aligned wall 15648 only extended 3 m south but was 2.1 m wide. It had no foundations and was set directly on made ground (15623). The north end of this wall was a return off wall 15646. The south end turned east and travelled 9 m continuing out the eastern baulk. This eastbound return was only 0.60 m wide. 5 courses of brick survived and these were c 19th-century pinkish-red and yellow frogged bricks set in a hard creamy-grey cement mortar with flecks of white and black. The bricks measured 230 x 110 x 70 mm. Concrete pad 15649, was poured directly over and on both sides of the east return.
- 5.2.13 The concrete pad 15649 was located along the eastern baulk of the site overlaying the E-W portion of wall 15648, and abutting wall 15646. It measured 2 m N-S x 3.6 m E-W and was 350 mm in thickness. The top surface of this concrete pad had 50 mm thick iron plating. The concrete was blue-grey in colour with large stone (100 mm) inclusions.
- 5.2.14 Concrete pad 15650 was located just south of wall 15648. It measured 2.6 m N-S x 3.4 m E-W and 550 mm in thickness. Although it did not contact wall 15648, its alignment suggests that they are related. This structure's surface had heavy amounts of iron corrosion but no iron plating present.

Structure 15651

- 5.2.15 Structure 15651 was a free standing brick-built soakaway, square in design with a tapered top. The top hole was 200 mm square and only 1 brick course thick. The brick work was offset as it descended until at 1.1m down the interior dimensions were 600 x 600 mm. Bricks were c 19th-century pinkish-red and yellow frogged bricks set in a hard creamy-grey cement mortar with flecks of white and black. The bricks measured 230 x 110 x 70 mm.

5.3 Finds

- 5.3.1 Within the historically made ground several iron objects were recovered. The objects did not have specific provenance because they were recovered from the machine bucket during ground reduction.
- 5.3.2 Context 15610 is a 64lb iron cannon ball (Small Find (SF) 1951). It was recovered from the building rubble in the north-west corner of site. The object was 230 mm diameter comprising one piece of moulded iron with no seams or holes visible. The surface was heavily corroded and pitted.
- 5.3.3 Context 15611 (SF 1952) was recovered from the building rubble near the centre of the site. The iron object was 435 mm long and had two outside diameters. At the base the diameter was 200 mm with a central opening of 90 mm diameter. The outside

diameter abruptly reduced to 170 mm 120 mm along its length. The iron measured 13 mm in thickness. The surface was heavily corroded and pitted. Both the SFs were placed in the on site finds store.

- 5.3.4 Two other pieces of shot were recovered from the southern half of the site. A 2 lb moulded iron shot with a seam around the circumference and a 16 lb shot that had a corroded plug of 60 mm diameter. Both of these were retained by the demolitions supervisor in order to ascertain if there was an explosive charge surviving within either. They were removed from site prior to recording.

5.4 Palaeo-environmental remains

- 5.4.1 No deposits suitable for environmental sampling were identified during the excavations.

6 DISCUSSION AND CONCLUSIONS

- 6.1.1 The gravel deposits observed in the south west of the excavation appear to be part of the natural gavel terrace the edge of which is thought to cross the southern part of this site (running north west to south east). The observations made would seem to confirm that the postulated line of this terrace (OA 2002, Fig 24 and OA February 2004, Fig 2) is fairly accurate at this point.
- 6.1.2 Since the ground reduction undertaken on site did not in the main exceed made ground levels, deeper elements of archaeological deposits that predate the earliest phases of land reclamation could be intact and unaffected by this development. In the instances where excavation did penetrate through the made ground into the alluvial silts (along drainage trenches and silt traps) no archaeology was seen. All structures recorded on site were constructed within the made ground deposits.
- 6.1.3 The building structures that did survive are likely to represent remnants of the Shot and Shell Factory (B 24) and its associated workshops that previously occupied this area from the mid 19th-Century. Wall 15646 is probably the southern E-W perimeter wall of the old factory complex, with ancillary structures indicating specific industrial customisation of the site including probable machine bases. Brick samples were collected for later assessment by a specialist.
- 6.1.4 The compacted layers observed in section 1165 in the south west corner of the site and interpreted as possible surfaces could well be associated with the main east west roadway through the site now known as Wellington Avenue or hard standing or working areas to the south of the main Shot and Shell Factory.
- 6.1.5 No remnants of Prince Rupert's Fort were observed. However, the Berkeley Homes Sales Office still occupies a portion of the site to the north of Building 23 and this area was therefore omitted from the current excavations. This area may potentially mask remains of the Fort. Plans currently indicate that this portion of the development will not be completed for some time. The area under the Berkeley

offices has a higher potential than the remainder of the site for archaeological findings and will need to be archaeologically monitored when it is excavated.

APPENDICES

7 APPENDIX 1 ARCHAEOLOGICAL CONTEXT INVENTORY

<i>Context</i>	<i>Type</i>	<i>Thickness</i>	<i>Depth/ height</i>	<i>Width</i>	<i>Length</i>	<i>Comments</i>	<i>Finds</i>
15600	Layer	450mm				Modern Made ground (Mmg)	
15601	Layer	190mm				Mmg	
15602	Layer	200mm				Mmg	
15603	Layer	>630mm				Historically made ground (Hmg)	
15604	Layer	900mm				Mmg	
15605	Layer	260mm				Mmg	
15606	Layer	440mm				Mmg	
15607	Layer	>570mm				Hmg	
15608	Structure		900mm	>0.60m	16.5m	Wall	
15609	Structure		800mm	>0.50m	12m	Wall	
15610	Finds reference			230mm		Cannon ball	Small Find number (SF), 1951
15611	Finds reference			200mm	435mm	Shell casing	SF 1952
15612	Structure		500mm	0.95m	7m	Wall	
15613	Structure		600mm			Concrete foundation	
15614	Structure	30mm	1m	3m	4m	Iron box	
15615	Layer	50mm				Mmg	
15616	Layer	350mm				Mmg	
15617	Layer	260mm				Mmg	
15618	Void					-	
15619	Layer	400mm				Mmg	
15620	Void					-	
15621	Layer	340mm				Hmg	
15622	Layer	>1.1m				Natural gravel	
15623	Layer	>150mm				Hmg	
15624	Layer	100mm				Peaty silt	
15625	Layer	80mm				Alluvial silt	
15626	Layer	>380mm				Alluvial silt	
15627	Structure		1.1m	1.4m	10m	Wall and foundation	

15628	Structure		1.2m	850mm		Iron cylinder	
15629	Cut		Unexc.	1.5m	38m	Linear E-W	
15630	Fill		Unexc.	1.5m	38m	Backfill	
15631	Layer	260mm				Mmg	
15632	Void					-	
15633	Layer	240mm				Mmg	
15634	Void					-	
15635	Layer	410mm				Hmg	
15636	Layer	120mm				Hmg	
15637	Layer	110mm				Industrial surface	
15638	Layer	180mm				Hmg	
15639	Layer	130mm				Hmg	
15640	Layer	70mm				Industrial surface	
15641	Layer	180mm				Hmg	
15642	Layer	120mm				Hmg	
15643	Layer	150mm				Hmg	
15644	Layer	100mm				Possible industrial surface	
15645	Layer	140mm				Hmg	
15646	Structure		1.25m	1.38m	37m	Wall and foundation	Sample no. 2586
15647	Structure			720mm	6m	Brick drain	Sample no. 2587
15648	Structure		1.15m	2.1m	2.6m	Wall	
15649	Structure	350mm		2.0m	3.6m	Concrete pad	
15650	Structure	550mm		2.6m	3.4m	Concrete pad	
15651	Structure		1.1m	800mm	800mm	Brick soakaway	

8 APPENDIX 2 BIBLIOGRAPHY AND REFERENCES

Broadway Malyan 2000 *A Desk based Archaeological Review of the Residential Development Zones: Royal Arsenal, Woolwich.*

GLAAS 2000 *Model Brief for Archaeological and Historic Building works. Archaeological Observation and Recording and Building Recording and Building Recording. The Woolwich Arsenal, London Borough of Greenwich.*

Mills Whipp Partnership 1995 *The Royal Arsenal Woolwich - An Archaeological Study - Vols I-IV*

OA April 2004 *The Royal Arsenal, Woolwich. Berkeley Homes Residential Development Phase 2. Archaeological Watching Brief Summary Statement. Client Report*

OA February 2004 *Proposed Development at the Royal Arsenal and Teardrop Site, Woolwich. Archaeological and Historic Buildings Desktop Assessment. Client Report.*

OA November 2002. *The Royal Arsenal, Woolwich: Phase 1 Infrastructure Works Post-Excavation Assessment Client Report*

OA February 2002 *The Royal Arsenal, Woolwich. The Grand Stores. Residential Development in the Former East and West Quadrangles. Predicting Obstructions. A Desktop Report. Client Report*

OAU 1999 *The Royal Arsenal Woolwich. Conservation and Curation advice. Client Report.*

RCHME 1994 *Historic Buildings Report-The Royal Arsenal at Woolwich Vols I and II.*

9 APPENDIX 3 GLSMR/RCHME NMR ARCHAEOLOGICAL REPORT FORM

1) TYPE OF RECORDING

Observation and recording

2) LOCATION

Borough: Greenwich

Site address: The Royal Arsenal, Woolwich

Site Name: Royal Arsenal, Woolwich, Building 22 Car Park

Site Code: RYA99

Nat. grid Refs: centre of site: 440792

Limits of site:

3) ORGANISATION

Name of archaeological company: Oxford Archaeology

Address: Janus House, Osney Mead, Oxford OX2 OES

Supervisor: Ryan Whalley

Project manager: David Score

Funded by: Berkeley Homes (East Thames) Ltd.

4) DURATION

Date fieldwork started: 15/06/04

Date finished: 26/09/04

Fieldwork previously notified?

YES

Fieldwork will continue?

Not known

5) PERIODS REPRESENTED

Post-medieval

6) PERIOD SUMMARIES

Post-medieval

Six 19th-Century brick walls and concrete foundations relating to the Shot and Shell Factory (1860-1960) and several industrial structures (concrete and iron) within that complex.

7) NATURAL

Type: Alluvial clayey silts

Height above Ordnance datum: 2.57m OD

8) LOCATION OF ARCHIVES

- a) Please provide an estimate of the quantity of material in your possession for the following categories:

NOtes 56 pages PLans 2 PHotos 4 films Ngtives 2
films
SLides 2 films COrrrespondence MScripts (unpub reports, etc)
BULk finds 2 brick samples SMall finds 2 SOil samples none
OTher

- b) The archive will be prepared and stored in accordance with MGC standards and will be deposited at an appropriate museum
- c) Has a security copy of the archive been made?: Not yet.

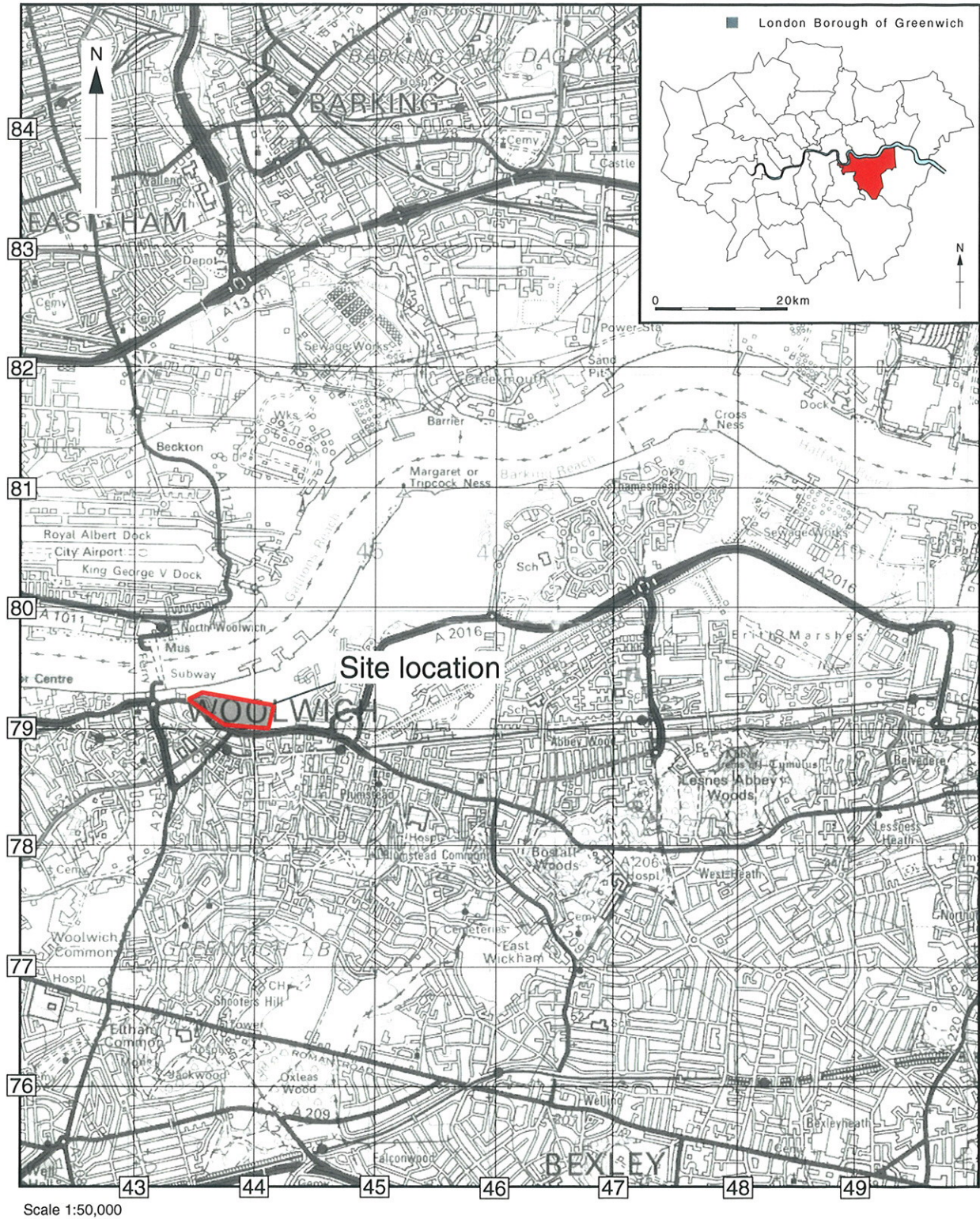
10) BIBLIOGRAPHY

See Appendix 3 Bibliography and References

SIGNED:

DATE: 22nd October 2004

NAME: RYAN WHALLEY:



Reproduced from the Landranger 1:50,000 scale by permission of the Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office
© Crown Copyright.1996 All rights reserved.Licence No. AL 100005569

Figure 1: Site location

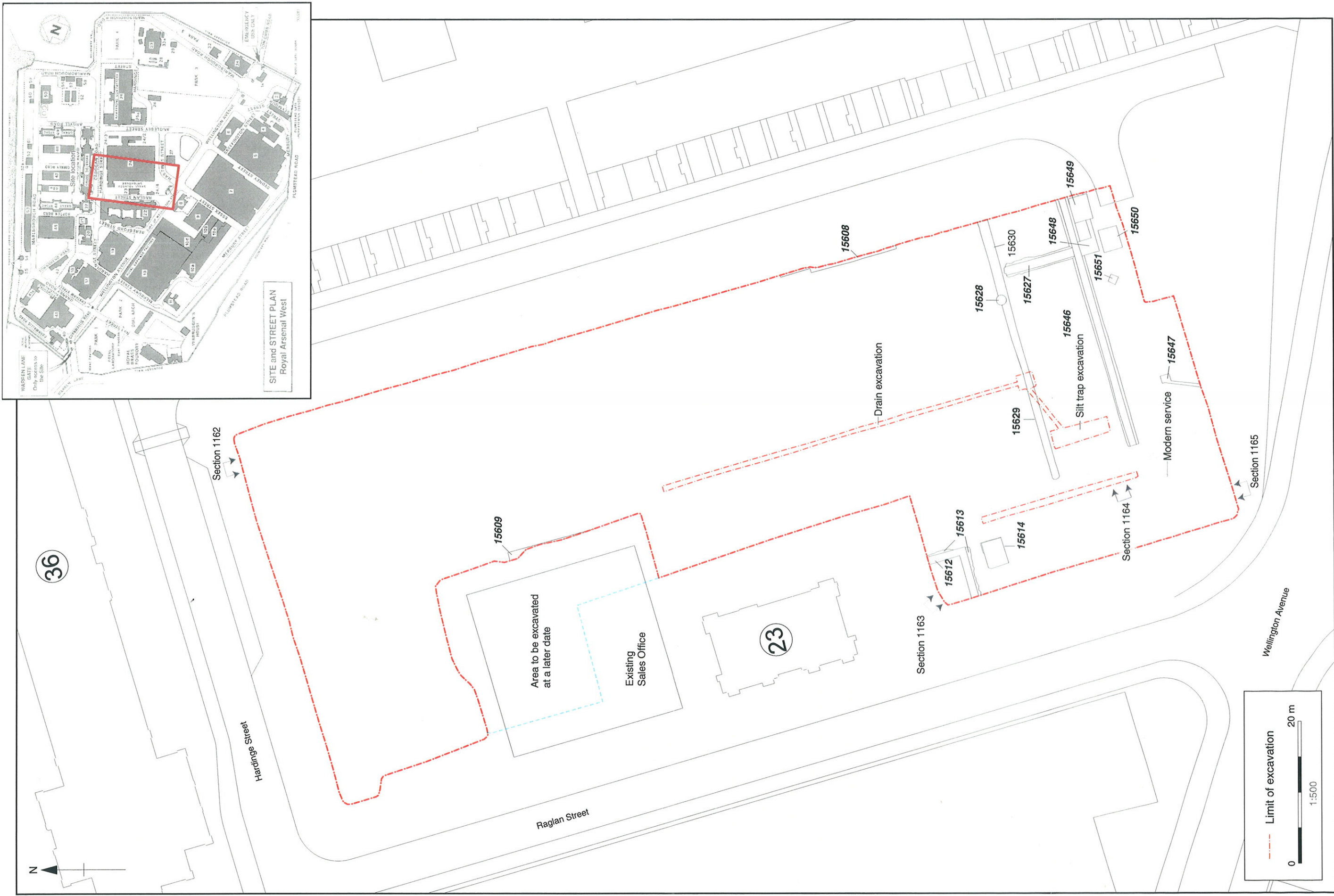


Figure 2: Site plan

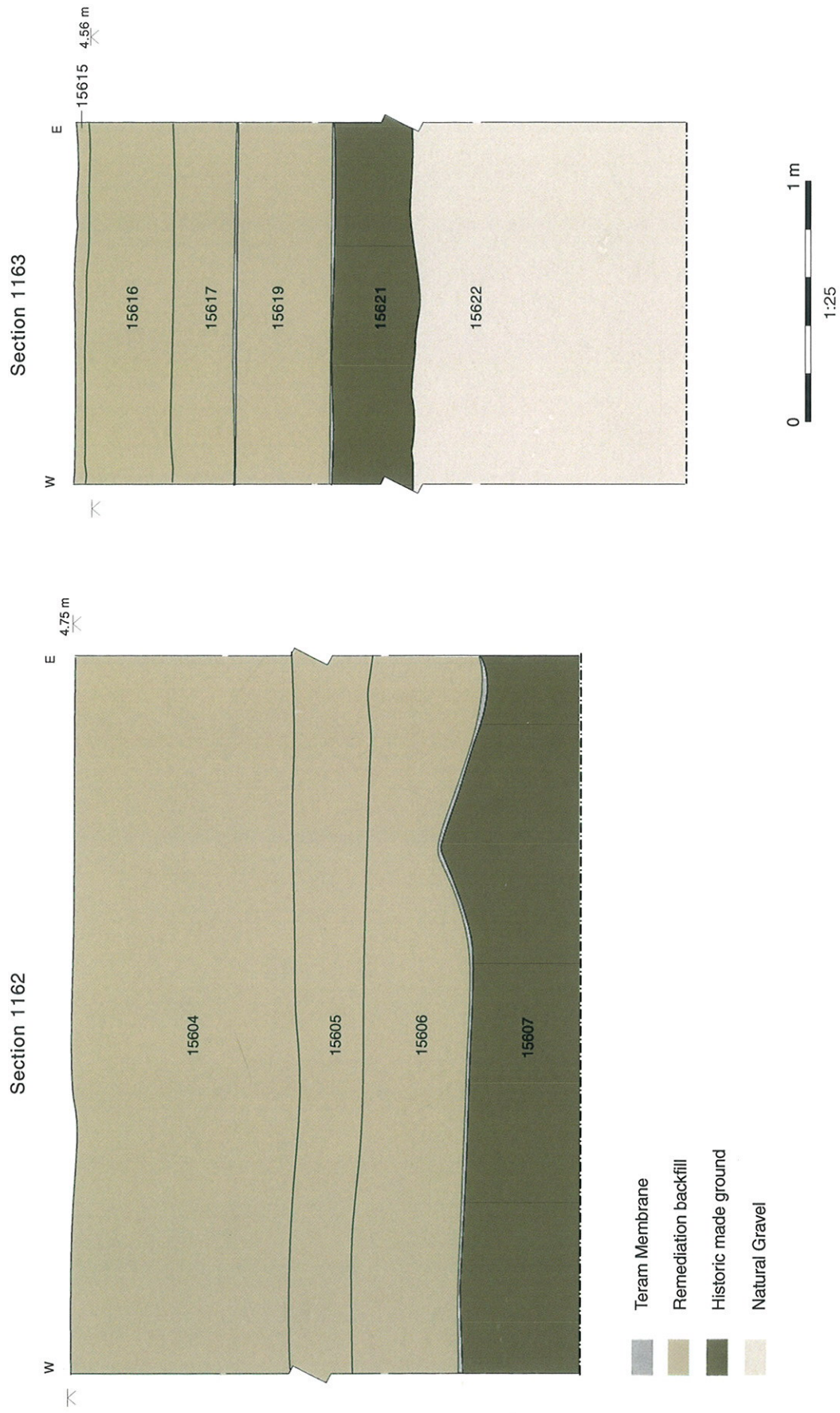


Figure 3: Sections 1162 and 1163

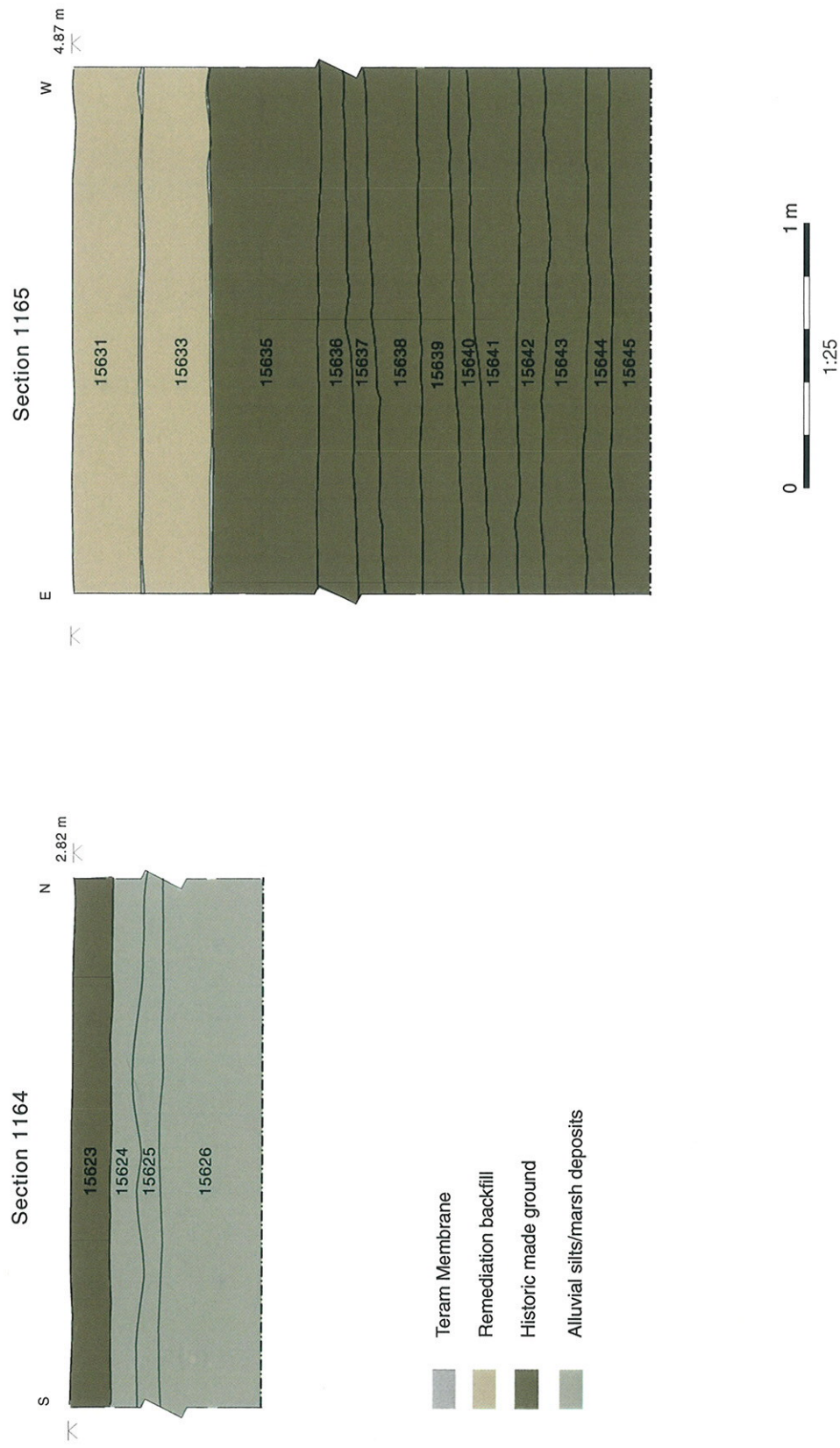


Figure 4: Sections 1164 and 1165



Oxford Archaeology

Janus House
Osney Mead
Oxford OX2 0ES

t: (0044) 01865 263800
f: (0044) 01865 793496
e: info@oxfordarch.co.uk
w: www.oxfordarch.co.uk



Oxford Archaeology North

Storey Institute
Meeting House Lane
Lancaster LA1 1TF

t: (0044) 01524 541000
f: (0044) 01524 848606
e: lancinfo@oxfordarch.co.uk
w: www.oxfordarch.co.uk



Director: David Jennings, BA MIFA FSA

Oxford Archaeological Unit is a
Private Limited Company, N^o: 1618597
and a Registered Charity, N^o: 285627

Registered Office:

Oxford Archaeological Unit
Janus House, Osney Mead, Oxford OX2 0ES