



## PLANNING DELIVERY ZONE 4

Work Package 3

Trenches PDZ4.08

PDZ4.25

Work Package 6

Trench PDZ4.28

Trench PDZ4.51



MUSEUM OF LONDON

**Archaeology  
Service**

PRE-CONSTRUCT ARCHAEOLOGY

# **PLANNING DELIVERY ZONE 4**

## **Work Package 3**

### **Trenches PDZ4.08**

#### **PDZ4.25**

## **Work Package 6**

### **Trench PDZ4.28**

### **Trench PDZ4.51**

Site Code: OL-06907, OL-06707 OL-08307  
National Grid References: 537624 184446, 537507 184199, 537435 184022

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## **Summary (non-technical)**

*This report presents the results of an archaeological evaluation carried out by the Museum of London Archaeology Service and Pre-Construct Archaeology (MoLAS-PCA) on two evaluation trenches (Trenches PDZ4.08 and 4.25, site code is OL-06907) excavated within Work Package 3 in Planning Delivery Zone 4 (PDZ4) and two further evaluation trenches, PDZ4.28 (site code OL-06707) and PDZ4.51 (site code OL-08307), also excavated in PDZ4 to the south of Work Package 3 within the Olympic, Paralympic and Legacy Transformations Planning Applications: Planning Delivery Zone 4, London Borough of Tower Hamlets E15. The report was commissioned from MoLAS-PCA by Capita Symonds Limited on behalf of the client the Olympic Delivery Authority (ODA).*

*Following the recommendations of the previous Detailed Desk-Based Assessment compiled for the Planning Delivery Zone, and subsequent consultation with the Greater London Archaeology Advisory Service (GLAAS), evaluation trenches were excavated on the site.*

*The results of the evaluation trenches have provided information on the position, construction and survival of the 19th century East London Waterworks Company reservoir that covers most of the evaluation area.*

*In the east, trench PDZ4.08 located the pier bases for the reservoirs sluice gate and also a section of its eastern wall. The trench also provided information that suggests that, although partially truncated during its decommissioning, the 19th century East London Waterworks Company reservoir remains generally intact. The backfill of the reservoir consists of late 19th century commercial and industrial waste. To the north, trench PDZ4.25 has provided information on the depth of truncation caused by the construction of the reservoir and the nature of its backfill deposits. To the south, trench PDZ4.51 has located a 19th century brick drain or channel structure that may be associated with the reservoir and water management in the area.*

*The deposits were also recorded and sampled by a geoarchaeologist. Preliminary evaluation of the samples has indicated that there is a limited assemblage of environmental remains such as snails and plant remains but good organic material suitable for radiocarbon dating and potential for the survival of microfossils, such as diatoms and pollen.*

*Evaluation trench PDZ4.28 has also shown that an interesting alluvial sequence survives intact in an area of land that lies between the reservoir to the west and the River Lea to the east. The deposits revealed an episodic sequence of alluvial clays building up across a once dry landscape from c 2m OD through flooding from the River Lea. The gravels existed as a dry land surface for a considerable period of time throughout the Holocene before inundation by the organic clays. The organic clays developed initially over the gravels through probable water table rise at the base of the sequence. Less organic blue clay deposits – thought to be essentially flood deposits – formed over the initial organic clays and could withhold ephemeral periods of stabilisation and dry land formation.*

*The results of the field evaluation have helped to refine the initial assessment of the geoarchaeological potential of the site. The samples obtained from trench PDZ4.28 have environmental significance and are likely to provide evidence for changes in the prehistoric and later river regime. Such evidence has potential to contribute to our*

*understanding of the changing landscape of the lower Lea in which past human activity took place.*

*In the light of revised understanding of the archaeological potential of the site the report concludes that further work on the samples already taken from the site would provide adequate mitigation of the archaeological resource.*

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# 1 Introduction

## 1.1 Site background

Two evaluation trenches (Trenches PDZ4.08 and 4.25) were excavated within Work Package 3 in Planning Delivery Zone 4 (PDZ4) of the Olympic, Paralympic and Legacy Transformations Planning Applications, in the London Borough of Tower Hamlets, hereafter called ‘the site’ (Fig 1).

Also, two further evaluation trenches, PDZ4.28 and PDZ4.51, were excavated in PDZ4 to the south of Work Package 3 (Fig 1).

Planning Delivery Zone 4 occupies a triangle of land bounded by the River Lea Navigation (Hackney Cut), the River Lea, and the railway on its western, eastern, and northern sides respectively. The two watercourses meet at the southern tip of PDZ4. Work Package 3 was located close to the north-east corner of PDZ4, while Trenches PDZ4.28 and PDZ4.51 were to the south, along the east edge of PDZ4. Trench PDZ4.51 was close to the southern tip of PDZ4 (Fig 2). MoLAS-PCA considers it appropriate to report the Work Package 3 trenches together with Trenches PDZ4.28 and PDZ4.51 due to the similarity of the overall results and their proximate location.

The OS National Grid Reference for the centre of Work Package 3 is 537624 184446. For Trench PDZ4.28 it is 537507 184199, and for Trench PDZ 4.51 it is 537435 184022. The footprints of Work Package 3 was defined by local property boundaries, and the limits of areas within which access was possible to excavate the evaluation trenches. Effectively, the footprint of Work Package 3 was delimited as a tool for defining the location and potential maximum extent of the pair of trenches (Fig 1). Ground level varies from 7.28m OD in the south to 8.17m OD in the north. Ground level immediately adjacent to Work Package 3 is at *c* 7.30m OD in (Carpenters Road). The site code is OL-06907 for the Work Package 3 trenches (PDZ4.08 and 4.25), OL-06707 for Trench PDZ4.28 and OL-08307 for Trench 4.51.

The proposed development of the site involves the construction of Spectator Support Buildings. Construction of a new land bridge LO3a, with attendant substructures, is also proposed over the North London railway line. These were the focus of three evaluation trenches. The Method Statement (MoLAS-PCA, 2007b) deemed that the additional construction proposals are not currently anticipated to have an impact upon the archaeological resource. A desk-based assessment was undertaken for PDZ4 (MoLAS-PCA, 2007a), and should be referred to for information on the natural geology, archaeological and historical background of the site, and the initial interpretation of its archaeological potential. A Method Statement (MS) was prepared for PDZ4 (MoLAS-PCA 2007b), which formed the project design for the evaluation.

## 1.2 Planning and legislative framework

The legislative and planning framework in which the archaeological exercises took place was summarised in the *Desk Based Assessment* and *Method Statement* which formed the project design for the evaluation (MoLAS-PCA 2007a and b respectively).

## 1.3 Planning background

In accordance with local and national policies, archaeological evaluation PDZ4 in advance of its redevelopment was required as part of the planning process. Evaluation is intended to define the archaeological potential and significance of any deposits present on the site, so that the Local Planning Authority can formulate responses appropriate to any identified archaeological resource.

The evaluation of the subject site will be undertaken in support of a condition required by English Heritage and attached to the consent granted by the Olympic Delivery Authority Planning Decisions Team with respect to Olympic, Paralympic and Legacy Transformation Planning Application Reference 07/90010/OUNODA and Site Preparation Planning Application Reference 07/90011/FUNODA. Condition SP.0.38 of planning permission 07/90011/FUNODA states:

*The site Preparation Development shall not be commenced until a Written Scheme of Investigation for Archaeological Works has been submitted to and approved by the Local Planning Authority. This shall be in accordance with the Generic Written Statement for Archaeology, the Written Scheme of Investigation for Archaeological Field Evaluation and the relevant Detailed Desk-Based Assessment. The archaeological work shall be undertaken in accordance with the approved Written Scheme of Investigation. If significant archaeological finds are encountered, further archaeological works or design measures may be required to mitigate the impact of development on those remains. This condition may be discharged on a Planning Delivery Zone Basis.*

*Reason: To ensure that archaeological remains are properly investigated and recorded.*

## 1.4 Origin and scope of the report

This report was commissioned by Capita Symonds Ltd on behalf of the Olympic Delivery Authority and produced by the Museum of London Archaeology Service and Pre-Construct Archaeology Ltd (MoLAS-PCA). The report has been prepared within the terms of the relevant Standard specified by the Institute of Field Archaeologists (IFA, 2001).

Field evaluation, and the *Evaluation report* which comments on the results of that exercise, are defined in the most recent English Heritage guidelines (English Heritage, 1998) as intended to provide information about the archaeological resource in order to contribute to the:

- formulation of a strategy for the preservation or management of those remains; and/or

- formulation of an appropriate response or mitigation strategy to planning applications or other proposals which may adversely affect such archaeological remains, or enhance them; and/or
- formulation of a proposal for further archaeological investigations within a programme of research

### 1.5 Aims and objectives

The following research aims and objectives for PDZ4 were established in the Method Statement for the evaluation (MoLAS-PCA 2007b) and in the Desk Based Assessment for PDZ4 (MoLAS-PCA, 2007a) and are intended to address the research priorities established in the Museum of London's *A research framework for London Archaeology* (2002).

- What is the extent of truncation within the former ELWC reservoir? Do deposits of archaeological interest survive in this area?
- Do Late Glacial deposits exist within the gravels on the site? What is the potential for past environment reconstruction and/or Late Upper Palaeolithic activity in these deposits?
- Did the tributary valley known to exist to the west of the site cross the site itself in the Pleistocene or Holocene and is there evidence for human activity associated with it? What were the characteristics of this valley in the prehistoric and historic periods and what information about the past environment and river regime might be available from it?
- Does evidence of prehistoric and historic occupation survive on the site?
- Does the post-medieval / pre-modern land surface survive on the site and what were its characteristics? Can it be related to the evidence of historic maps?
- What are the thickness, date and characteristics of the made ground across the site?
- Are there any hulks of scuttled vessels used in infilling within the ELWC reservoir (as at Chester?).
- Are there any surviving mechanised remains associated with the ELWC reservoir (pumps, engine equipment etc)?

## **2 Topographical and historical background**

The following summary of the geological and archaeological background to the site is based upon the desk based assessment for PDZ4 (MoLAS-PCA 2007a).

### **2.1 Modern topography and drainage**

Planning Delivery Zone Four is located on the western side of the floodplain (valley bottom) of the Lea Valley, between the Hackney Cut and the River Lea, which form the western and eastern boundaries of the site respectively. The extent to which these rivers are natural or have been manipulated or even entirely created by people in the past is not yet known. The pattern of rivers flowing across the site in the past will, however, have influenced its use and hence its archaeological potential.

The landscape of the site in the past will have been very different to its characteristics today. In particular, the dumping of thick made ground deposits and fill in many areas has obscured its ancient topography. Historic excavations, such as quarrying and the creation of canals and reservoirs, have also removed evidence of the ancient landscape.

### **2.2 Natural topography and past landscape setting**

The site lies on alluvium, which represents a range of different wetland and dryland environments existing on the valley floor ('floodplain') of the Lea from the Mesolithic period onwards. The alluvium overlies gravels and associated deposits of Palaeolithic date. The higher ground of the river terrace lies c 200m west of the site, on the opposite side of the Hackney Cut. The gravels are the most recent in a series of Pleistocene river terrace deposits, which today form an irregular flight of steps in the valley side. Tertiary bedrock, which in this area is variably London Clay and Woolwich and Reading Beds, underlies the gravels. The bedrock pre-dates the period of human evolution and thus its surface acts as the bottom line for deposits of archaeological interest.

Most of the site formed an area of slightly higher ground, raised above the deeper parts of the valley floor in the past and, as a result, dryland activity and occupation is more likely to have taken place than wetland exploitation, in prehistory in particular.

- In general the site is characterised by relatively thin alluvium that is likely to have similar characteristics and archaeological potential to that found in recent archaeological excavation at Warton Road (OL-003 05). The alluvium represents relatively dry environments and may contain occupation evidence, especially as it lies close to the Old Ford area and to Roman riverside activity recently recorded at Crown Wharf, just beyond the south west boundary of the site. However, it is unlikely to have good potential for preserving environmental evidence.
- The deepest part of the valley floor lay close to the eastern boundary of PDZ4, which suggests that the site lay to the west of the main axis of the river, prior to its manipulation by people in the past.
- A tributary valley drained off the river terrace to the west of PDZ4 and may have crossed the site, although there are insufficient borehole records to assess whether it

did so. The characteristics of this valley, beyond the site, suggest that from the Mesolithic onwards, it may have been an area of pools fringed with marshy land.

- Earlier evidence could survive within the tributary valley. In particular, Late Upper Palaeolithic and Early Mesolithic activity may be found at the base of the alluvial sequence, as knapping scatters and other remains from this earliest period of post glacial occupation have been found in similar locations further upstream. Furthermore, evidence relating to the Late Glacial period may be preserved within the gravels. Such information would be of considerable significance in reconstructing the environment in this part of the Lower Lea in the Late Upper Palaeolithic period. Deposits of Late Glacial date have already been identified in previous boreholes drilled to the east of the site.

### 2.3 Prehistoric

There are no known sites or finds of prehistoric date within the site. Evidence from a number of sites in the Lea Valley indicates however that it was well populated during the both the Bronze Age (1,800–600 BC) and Iron Age (600 BC–AD43) periods. These periods, along with the Neolithic (4000–1800BC), were characterised by forest clearance, permanent settlement and farming, with increasing population throughout each period. The gravel terrace beside the River Lea would have been attractive for early settlers, the gravels producing light, fertile and well-drained soils, with close access to the rivers for food resources and transport. Areas of adjacent marsh, prior to subsequent reclamation in the medieval period (possibly earlier) would have been exploited for varied and predictable resources such as food, from hunting and fishing, clay for pottery manufacture, reeds for basketry, along with rough grazing. Well-preserved Bronze Age and later timber structures and/or trackways such as those found elsewhere in the valley provided access across boggy areas between the areas of higher ground. A recent MoLAS-PCA evaluation at Carpenters Road, *c* 300m to the east of the site revealed butchered bone in a peat land surface of Neolithic date and worked wood of Bronze Age date had been washed up as drift wood on the margins of the later river.

### 2.4 Roman

There are no known sites or finds of Roman date within the site. During this period the site lay *c* 5km to the north-east of Londinium and probably within its *territorium*, the eastern extent of which may have been defined by the River Lea. Evidence from archaeological investigations in East London suggests that this area was a managed agricultural landscape of scattered farmsteads and villas supplying produce to London.

The Lea was probably used to transport agricultural produce to the London area and in the late period, with pottery from Much Hadham (via the River Stort). Archaeological excavations have established that a Roman settlement existed at Old Ford, *c* 400m to the south-west of PDZ4, in the form of domestic and industrial structures; postholes, pits, and field ditches in the area of Lefevre Walk. The settlement grew up beside a major Roman road, which crossed the marsh immediately south of PDZ4, as it headed north-east from Aldgate towards the early military base and Colony at *Camulodunum* (Colchester). Pertinently, an archaeological evaluation

on the opposite side of the Hackney Cut, *c* 100m to the south-west of the site revealed the footings of a Roman bridge or jetty. This comprised 40 timber piles on a WNW–ESE alignment, indicating the presence of a previously unrecorded road that presumably connected to Ermine Street beside the Northern Outfall sewer.

## 2.5 Saxon

There are no known sites or finds dated to the early medieval period within the site or its immediate vicinity. PDZ4 would have been situated within a rural area within the huge manor (estate) of Stepney (*Stebenhythe*), which included most of the area of modern Tower Hamlets.

Stratford means *fording place on the old street*, which probably refers to the Roman road/causeway across the marshes between Old Ford and Stratford, the conjectured line of which lies *c* 200m south of the site. Evidence of Saxon activity has been recorded on both sides of the valley: at Old Ford, *c* 550m to the north-west of the site, and at Stratford, *c* 650m to the north-east. The nature of this activity is currently poorly understood.

Tradition has it that after Danish marauders sailed up the River Lea to Hertford, King Alfred cut a series of channels in this part of the Lea, lowering the water level and forcing the enemy to leave their vessels aground and therefore prevent their escape. Alternatively, and perhaps more likely however, the channels may have been adapted for use as millstreams. Excavations in the area of Stratford Station, *c* 900m to the east of PDZ4 have revealed a Saxon timber revetment along the Channelsea, with associated leather waste and late Saxon pottery, and *c* 650m to the east of the site, a late 7th/8th-century bridge abutment or jetty of timber piles with masonry superstructure has also been revealed.

Throughout this period the site was located within marshland used for rough grazing. Domesday (AD1086) mentions a number of mills along the Lea and its tributaries although the location of these mills is uncertain. One mill was possibly located on the River Lea, *c* 450m south of the site.

## 2.6 Medieval

There are no known sites or finds dated to the later medieval period within PDZ4. As with much land elsewhere in East London, PDZ4 fell within Stepney manor and was held by the bishop of London and is recorded as such in Domesday (AD1086). Subsequent bishops owned this extensive manor, with several tenanted sub-manors, until the Reformation in the mid 16th century. The settlements of Hackney Wick, Old Ford and Bow were located on the very edge of the gravel terrace higher elevations, *c* 500m to the north-west, *c* 125m to the south-west and *c* 850m to the south of the site respectively.

The site is located on the floodplain of the River Lea, within a former marshland environment that has evolved from a landscape that humans exploited to one that they first modified through drainage and embankments, and then transformed through extensive reclamation. Prior to this, the marsh would have been prone to flooding and largely unsuitable for settlement or arable cultivation. It is likely that the marshland within the Lea Valley began to be drained and reclaimed in the later medieval period



(possibly earlier), primarily for economic reasons, in providing improved pasture for livestock and fertile land for crops. The site lay within the marshes on the northern edge of the ancient parish of St Mary, Stratford-le-Bow. Immediately to the north lay Hackney Parish, and there is some evidence to suggest that the two parishes shared the area covered by the site as communal pasture or meadow.

## 2.7 Post-medieval

Rocque's map of 1746 indicates that the site lay within Bow Marsh, *c* 500m to the north-east of the settlement at Old Ford. The topography of the marshland changed considerably, following the construction of the Hackney Cut (canal) in 1768, along with other modifications to watercourses and arrival of railway infrastructure in the mid 19th century.

The site appears to lie within several reclaimed land parcels, apparently with one of the channels of the Lea crossing the site. Following the 1767 River Lea Act, the River Lee trustees constructed a straight channel along the western side of the valley, to the west of the main channel of the River Lea, named Hackney Cut or New Cut. The new channel was an improvement for river traffic. The west bank of the Hackney Cut (or Lea Navigation) forms the western border of PDZ4. Following an Act of 1829, the East London Waterworks Company constructed a channel parallel to the Hackney Cut, on its east site, named the East London Waterworks Canal (see fig 16 of MoLAS-PCA 2007a). This now infilled channel lies a short distance to the west of the site.

Prior to the mid 19th century, the site was located in reclaimed marshland and was used by the parishes of Hackney and St Mary Stratford le Bow for meadow. Before 1849, probably in *c* 1847–8, the East London Waterworks Company constructed a large triangular reservoir in PDZ4, immediately south of the site (Fig 3). This proved to be short lived, almost certainly because it proved difficult to maintain quality drinking water, and was decommissioned in 1892. The reservoir was subsequently infilled between 1892 and 1896.

The ELWC reservoir is shown for the first time on Stanford's 1862 Library Map of London (not reproduced). The same situation is shown on the 1867 Ordnance Survey map (Fig 3). Trees were around its edge and a large circular tree-covered island was located in the centre. The presence of the island and the vegetation suggests that an attempt had been made to improve the visual aspects of a feature perhaps considered an eyesore on the edge of London's rapidly expanding suburbs. The map shows artificial barriers separating the reservoir and the River Lea on the east side (it was not possible to access this area during the site visit) and at its southern tip. These barriers would have had channels and sluices used to control the flow of water into/out of the reservoir. Two small buildings on the eastern side of the reservoir were presumably cottages and/or offices and workshops of the staff who maintained it. Cassell, Petter and Calpin's Map of London, published in 1864 (not reproduced) shows two pontoon type features on the eastern barrier, which are probably associated with sluice gates.

In 1892, the works at Old Ford were finally given up. The ELWC was superseded by the Metropolitan Water Board in 1904 (becoming Thames Water Authority in 1974). With the closure of the ELWC works the reservoir within the site was completely infilled. This would have required a considerable volume of fill material, and it is likely that domestic waste and other refuse was used for this purpose and that this was then capped with soil.

The 20th century saw increasing industrialisation of this part of the Lea Valley; Carpenter's Road is depicted by the 1914 OS map crossing the northern end of PDZ4 (not reproduced). Manufactories and warehousing gradually appeared across the former watercourses and the infilled reservoir, eventually giving way to Bow Industrial Park and the light industrial units in the east of the site adjacent to the river.



### 3 The evaluation

#### 3.1 Methodology

All archaeological excavation and monitoring during the evaluation was carried out by a joint MoLAS-PCA team in accordance with the preceding *Method Statement* (MoLAS-PCA 2007b) and the MoLAS *Archaeological Site Manual* (MoLAS, 1994).

Two evaluation trenches were excavated targeting the locations of the impacts from the spectator support building SSB 11 (café site) and construction bridge T02 and new footbridge FO6 (Park Lock Bridge) of the proposed development (PDZ 4.08 and 4.25 respectively).

Trench PDZ 4.28 was originally located to evaluate the impact of the north side of proposed footbridge FO7 (Stadium North Bridge) and the west side of proposed bridge FO17 (Stadium Escape Bridge). However, Edmund Nuttall and Sons, the site contractor excavated the trench c 150m to the north of that position due to access issues.

Trench PDZ4.51 was located towards the south of PDZ4, close to temporary bridge works.

Each trench was excavated to the base of the alluvial sequence, with machining of trenches done in stages in cases where archaeological features were encountered within the sequence. A mechanical excavator using a flat bladed ditching bucket undertook the bulk excavation, monitored by an archaeologist, a banksman and a site foreman at all times. A geoarchaeologist was in hand to visit the site and to take samples as required.

Work on Trench PDZ4.08 began in the week ending 9 January 2008 and was completed in the week ending 25 January. Trench PDZ4.25 began in the week ending 26 October 2007 and was completed in the week ending 5 November. Trench PDZ4.28 began in the week ending 21 September 2007 and was completed in the week ending 16 October. Trench PDZ4.51 began in the week ending 19 November 2007 and was completed 26 November.

The trenches were located by the MoLAS-PCA surveyor using an EDM. This information was electronically collated and plotted onto the OS grid. Levels were calculated from benchmarks established by both the surveying teams of MoLAS-PCA and also the on site contractors engineers, these benchmarks were located close to each trench.

A written and drawn record of all archaeological deposits encountered was made in accordance with the principles set out in the MoLAS site recording manual (MoLAS, 1994). For OL-06907, Trench PDZ4.08 produced 1 trench plan at 1:100 scale, 7 context records and a section at 1:20 scale; Trench PDZ4.25 produced 1 trench plan at 1:50 scale, 9 context records and a section at 1:20 scale. For OL-06707, Trench PDZ4.28 produced 1 trench plan at 1:50 scale, 7 context records and a section at 1:50 scale. For OL-08307, Trench PDZ4.51 produced 1 trench plan at 1:20 scale, 8 context

records and a section at 1:20 scale. The finds and records will be deposited under the relevant site codes in the LAARC.

### 3.2 Results of the evaluation

(See Fig 2 for trench locations).

#### 3.2.1 OL-06907: Trench PDZ4.08

Location	Carpenters Business Park
Dimensions	46.50m N-S by 16m E-W
Modern ground level	7.90m OD
Base of modern fill	7.35m OD (levelling layer for present slab)
Depth of archaeological deposits seen	5.65m (19th and 20th century dumped deposits including backfill of reservoir)
Level of base of deposits observed and/or base of trench	1.70m OD
Natural observed	N/A

*Table 1 Trench PDZ4.08 deposit summary*

See Fig 3–Fig 9.

The trench, which measured a total of 46.50m N-S by 16m E-W, was machine excavated to a depth of 3m below present ground level and a further 2m in depth in its centre.

Due to the extent of the trench, its close proximity to the present river Lea and the ground conditions, which included a great amount of water making the soft uncompacted backfilled deposits of the reservoir unstable, it was not practical to machine excavate the entire trench. Instead, in an attempt to locate the full depth of the reservoir structure a machine slot was excavated within this trench against the northern most pier base [13] (see below). This slot was excavated to a further depth of 3.20m (a total of 6.20m below the present ground surface). Unfortunately, for safety purposes the excavation was halted at this point, before the base of the footings could be located.

Along the eastern edge of the trench at a depth of 3m, two brick structures [13] and [14] were uncovered. These represent the internal pier bases of a sluice gate to the East London Waterworks Company reservoir, constructed *c* 1847-48. Each is seen of the 1867 Ordnance Survey map (Fig 3). This was decommissioned in 1892, and subsequently backfilled between 1892 and 1896. The brick structures had been truncated from above to depths of between 4.87m OD in the south [14] and 5.20m OD in the north [13]. The original ground height close to the reservoir in the 19th century is shown to be *c* 5.50m OD on the Godfrey Map of 1867. Therefore, between 0.30m and *c* 0.40m had been removed from the upper portion of each pier.

The sluice gate pier bases indicated that the trench was positioned just within the reservoir. The trench was then extended to the south in order to locate the wall of the reservoir and land beyond its extent. The wall of the reservoir [15] was aligned E-W across the southern extent of the trench at truncated depths of between 5.09m OD in the east and 3.92m OD in the west.

The part truncation of the reservoir probably occurred during its decommissioning and backfilling, perhaps to help provide access into such a large structure.

The backfill material consisted of mixed dumps of late 19th century industrial and commercial waste [12], recorded at up to a level of *c* 5m OD. These deposits were machine excavated, but not bottomed, to a depth of 3.40m.

Overlying the reservoir structure and its backfill was a further 2.35m thick deposit of late 19th-20th century industrial and commercial waste [11]. Pottery from [11] was dated to after 1830 (see below 10.1 The pottery). The base and body of a mid 19th to early 20th century clear lead glass tumbler was also recovered from [11] (see below 10.2 Small finds).

This mixed dumping was recorded at a height of 7.35m OD and is probably part of the same sequence of dumping as the backfill of the reservoir.

Sealing the dumped deposits was an 0.35m thick levelling layer for the (modern) 0.20m thick concrete slab, recorded with a surface height of 7.90m OD. This slab represents the present ground surface of the Carpenters Business Park.

Although earlier archaeological and geoarchaeological deposits were not reached due to the constraints imposed by water ingress, the location of the reservoir sluice gate and detail of its truncation and the backfilling will help provide useful information of the survival of this large feature and other deposits in the area.

### 3.2.2 OL-06907: Trench PDZ4.25

Location	Carpenters Business Park
Dimensions	32m N-S by 17.80m E-W
Modern ground level	8.17m OD
Base of modern fill	<i>c</i> 7m OD
Depth of archaeological deposits seen	4.66m (19th century dumped deposits including the backfill of the reservoir)
Level of base of deposits observed and/or base of trench	2.34m OD
Natural observed	N/A

Table 2 Trench PDZ4.25 deposit summary

See Fig 10 and Fig 11.

The trench measured 32m north-south by 17.80m east-west and was excavated to a depth of 5.83m at 2.34m OD.

Levels were calculated from the contractor's (Edmund Nuttall and Son) TBM (M17) located south-east of the trench at 8.228m OD. The trench was surveyed the trench with a total station from survey points supplied by the contractor: M16 located north-east of the trench (OS 537628.9935E; 184502.229N) and M17 located south-east of the trench (OS 537636.3943E; 184468.775N).

The earliest deposits were redeposited alluvial silty clays and gravels: [9] was clay silt (0.33m thick at the north in section thinning to 0.03m in the south of the section. This deposit was not fully excavated due to health and safety restrictions on the depth of the trench). It survived to a height of 2.55m OD. Overlying [9] was gravel [8] (0.32m

thick) surviving to a height of 2.58m OD. Overlying [8] was alluvial clay [7] approximately 0.24m thick surviving to a height of 2.84m OD.

Cutting these deposits was post-hole [5] containing very large disturbed packing stones [4] and a fallen wooden timber post [6] probably dating to the late 19th century.

Overlying these deposits was a series of late 19<sup>th</sup> century dumps [3], [2] and [1] approximately 4m thick to a height of 7.11m OD. Pottery from [2] and [3] was dated after 1805 and 1825 respectively (see below 10.1 The pottery). [2] also included two 20th-century teapots and a 19th or 20th century perfume bottle (see below 10.2 Small finds). An unstratified, fragmented, mid 19th century or later shoe was also recovered (see below 10.3 Leather). Sealing these dumped deposits was 1.40m of modern made ground comprising hardcore capped by a concrete slab.

It is highly likely that this area to the eastern edge of the East London Reservoir was quarried for gravel to provide ballast for the reservoir and then backfilled soon after.

Although the trench appears to lie just to the east and outside of the reservoir footprint the re-deposited alluvial material may be the result of either truncation or represent the backfill of construction work associated with the reservoir.

No samples were taken from this trench.

### 3.2.3 OL-06707: Trench PDZ4.28

Location	Riverside House
Dimensions	36m N-S by 19m E-W
Modern ground level	7.28m OD
Base of modern fill	
Depth of archaeological deposits seen (alluvium)	2.85m
Level of base of deposits observed and/or base of trench	2.08m OD (base of trench and top of gravels)
Natural observed	2.08m OD (river terrace gravels)

Table 3 Trench PDZ4.28 deposit summary

See fig Fig 12 and Fig 13.

The trench was machine excavated, using a flat bucket. The top of the trench at 7.28m OD measured 36m north-south by 19m east-west and was stepped to a depth of 5.3m at 2.08m OD. The base of the trench at 2.08m OD measured 12m north-south by 7m east-west.

Levels were calculated from a survey point supplied by the contractors (Edmund Nuttall and Sons) to the south west of the trench – T1 at 7.33m OD. The trench was surveyed from the OS co-ordinates at T1 (537477.9052E; 184195.1062N) and T2 using a total station.

The earliest deposit at the base of the trench was river terrace gravel [7] surviving to a height of 2.08m OD. The gravel was not excavated.

Overlying the gravel was a sequence of clay and organic alluvial deposits: [6] (0.30m thick); [5] (0.30m thick); [4] (0.40m thick) and [3] surviving to a height of 4.18m OD.

These deposits represented a marshland environment subject to repeated episodes of flooding and stabilisation.

Overlying [3] was redeposited river terrace gravel and sand [2], which was 0.45m thick at a height of 4.63m OD. Overlying [2] was redeposited alluvial silt [1], which was 0.30m thick at a height of 4.93m OD.

Sealing these deposits was a 2.40m thick deposit of made ground capped by tarmac recorded at a height of 7.28m OD. The made ground dated from the late 19<sup>th</sup> century to the late 20<sup>th</sup> century.

Monolith samples were taken through deposits [2], [3], [4], [5], [6] (Nos. 1 to 5).

Bulk samples were taken from [4] (No. 6), [6] (No. 7), [3] (No. 8) and [5] (No. 9).

Sample Nos. 10, 11 and 12 were taken from [4], [6] to gain radiocarbon dates.

### 3.2.4 OL-08307: Trench PDZ4.51

Location	Bow Industrial Park
Dimensions	10.70m N-S by 3m E-W
Modern ground level	7.30m OD
Base of modern fill	2.60m OD
Depth of archaeological deposits seen	1.90m (brick structure)
Level of base of deposits observed and/or base of trench	2.10m OD (base of trench)
Natural observed	N/A

Table 4 Trench PDZ4.51 deposit summary

See Fig 14.

The trench, which measured a 10.70m N-S by 3m E-W, was machine excavated to a depth of 5.20m below present ground level of 7.30m OD. The trench sides were shored using a steel trench box frame and sheet piles to provide safe stable edges.

At the base of the trench a deposit of silty clay [14] was recorded in the northern half of the trench at a height of *c* 3.10m OD. In the southern half of the trench a similar silty clay deposit [15] was recorded at a height of 2.60m OD. These deposits, contained occasional fragments of 19th century CBM and may represent a modern alluvial build up.

Crossing the middle of the trench on an E-W alignment was a 19th-early 20th century brick structure which consisted of a southern wall [13] running parallel to two brick pillar/walls [11] to the north with a brick floor [12] at 3.20m OD in between. The northern wall [11] had an opening approximately 1m wide that was capped with a large steel/iron plate. The structure is linear, with an approximately 1.80m wide internal space between the two walls and may represent a water channel, drain, inspection chamber or culvert possibly associated with the reservoir to the north or other water management system. The walls survived to a height of 4.50m OD.

Infilling this structure was an 0.80m thick deposit of dark gray clayey silt [10] recorded at an approximate height of 4m OD. Overlying this was a second fill [9] that consisted of an orange brown clayey silt deposit, 0.70m thick, and recorded at a height of 4.70m OD.

Overlying the brick structure and silty clay infill deposits was a 19th–20th century mixed dump deposit [8] recorded at a height of 6.30m OD. Sealing this was a further 0.60m mixed levelling layer for the present concrete slab that was recorded with a surface height of 7.30m OD.

### 3.3 Stratigraphic interpretation of the site

#### 3.3.1 Late Glacial/ early Holocene deposits forming the buried topography

<i>Trench</i>	<i>Contexts</i>	<i>Samples</i>
PDZ4.28	7	none

Table 5 Index of Late Glacial/ early Holocene deposits

Gravels were recorded at the base of Trench PDZ4.28 (OL-06707) at *c* 2m OD. G

Given the OD height it is likely that the gravels existed as a dry land surface for a considerable period of time throughout the Holocene before inundation by the organic clays which supports the proposed landscape model as described in the desk based assessment for the Lea Valley Gravels. Notably, radiocarbon dating of the organic clays could provide a *terminus ante quem* for the dry land surface of the gravels.

#### 3.3.2 Alluvial Deposits

<i>Trench</i>	<i>Contexts</i>	<i>Samples</i>
PDZ4.28	3	{4}
PDZ4.28	4	{3} {6}
PDZ4.28	5	{5}
PDZ4.28	6	{2} {7} {8}

Table 6 Index of alluvial deposits

In Trench PDZ4.28 (OL-06707) a series of alluvial deposits built up across the site with the initial development of context [6], a dark brown organic silty clay which formed probably as a result of water table rise and flooding from the River Lea. The accretion of this sediment was likely to be slow and stable enough to allow floodplain vegetation to develop. Further increases in fluvial energy coupled with water table rise led to the flood deposits of essentially blue clays characterising contexts [5],[4] and [3] that overlay [6].

There were apparent hiatuses in the flooding cycle however as context [4] is slightly more organic than contexts [5] or [3] indicating a period of time when again, the accretion of this sediment was likely to be slow enough to allow floodplain vegetation to develop to some extent. Both contexts [5] and [3] however, do exhibit faint, oxidised root channels throughout possibly indicative of soil development in an essentially swampy, flood prone environment.

#### 3.3.3 Historic water management

<i>Trench</i>	<i>Contexts</i>	<i>Samples</i>
PDZ4.28	1	none
PDZ4.28	2	none



*Table 7 Index of historic water management contexts*

In Trench PDZ4.28 (OL-06707) contexts [2] and [1] overlying the naturally deposited alluvium were considered redeposited gravel and alluvium respectively, associated with the dredging or deepening of the adjacent River Lea therefore offering no reliable stratigraphic or environmental information and consequently left unsampled.

### **3.3.4 Recent Developments**

The evaluation has provided detail of the exact location, nature and survival of the sluice gates and a section of the eastern wall of the reservoir constructed *c* 1847-48 by the East London Waterworks Company (PDZ4.08 - OL-06907). Details of the area and depth of truncation caused by its construction have also been provided by the evaluation (PDZ4.25 - OL-06907).

The reservoir was decommissioned in 1892 and infilled between 1892 and 1896, the results of the evaluation have shown that the backfill deposits consisted of both commercial and industrial waste dating to the late 19th century.

Trench PDZ4.51 (OL-08307) to the south of the site has provided evidence for the survival of a 19th century water management structure that may also be associated with the reservoir.

## **3.4 Evaluation of environmental evidence**

### **3.4.1 Introduction**

Trench PDZ4.28 (OL-06707) is the only trench that has provided information on the survival of alluvial deposits close to the construction of the reservoir.

A MoLAS-PCA geoarchaeologist to examine, record and sample the natural sequence exposed within the evaluation trench. The geoarchaeologist's description and interpretation of the deposits form part of the trench results and stratigraphic interpretation in sections 3.2 and 3.3 above.

The stratigraphy recorded in a representative profile of the trench sequence, as drawn and described by the geoarchaeologist, should be entered into the MoLAS-PCA geoarchaeological stratigraphic database of the Lower Lea as part of the assessment. This database will be used in post excavation stages of the project, to reconstruct the evolving past environment of the Olympics site and to target samples and locations for analysis.

### **3.4.2 Sediment characteristics**

A monolith tin sequence, sample {1}, through contexts [2]/[3]/[4]/[5]/[6]/[7], was taken through the alluvial deposits of trench PDZ4.28 (OL-06707). The tins provide an undisturbed column of sediment for off-site examination. The location selected for sampling was considered to be a representative profile of the deposits exposed in the trench. The monolith sequence is suitable for sub-sampling for microfossils and sedimentary techniques, intended to gain a better understanding of the changing environments represented by the Holocene gravels and alluvial deposits across the site as a whole.

Sedimentary techniques such as loss on ignition, magnetic susceptibility and soil micromorphology might tell us more about the depositional and post depositional environment of the alluvial deposits. Further retention until the analysis stage of the project is likely to subsequently be required, as this is when more detailed sedimentary techniques will be carried out.

### **3.4.3 Microfossils**

Microfossil examination of might be able to provide information about the river characteristics and surrounding vegetation. The monoliths will be retained until environmental assessment is undertaken, when sub-samples for microfossils such as pollen and diatoms will be examined to determine their potential for past environment reconstruction (see below).

### **3.4.4 Bulk sample processing**

Four environmental bulk soil samples ({2}[6], {3}[4], {4}[3], and {5}[5]) were collected from PDZ4.28 (OL-06707), for the potential recovery of plant and invertebrate remains, to provide information on the local environment and any human activity at the time of deposition. Any such information would complement that obtained from monolith samples through sedimentary sequences. The aim of the evaluation was to establish the presence or absence of biological remains, and whether a full assessment of any of the materials present in the samples should be carried out.

Five litre sub-samples from each sample were processed by flotation over a 0.25mm mesh, with the residue washed over a 0.5mm mesh. The flots were stored wet to help with the preservation of any organic material and the wet sieved fractions were dried. Five litres of soil or less were retained from each sample for further work. Small amounts of each flot were scanned rapidly under a low-power binocular microscope to determine whether further assessment would be worthwhile.

All except {4} [3] produced a flot. A summary of the results is given in Table 8. This information has been used to determine the most appropriate strategy for assessment (see below).

### **3.4.5 Radiocarbon dating**

Although some idea of the date of the deposits excavated has been inferred from their characteristics and level, no reliable date has yet been obtained for the sequence. Environmental evidence, unlike artefacts, is not intrinsically dateable and the information about the past landscape preserved in the deposit sequence means little unless it is tied in to an archaeological timeframe.

In general, no artefacts suitable for spot dating were recovered from the alluvial sequence. However, the deposits excavated contained plant remains, from which radiocarbon dates might be obtained. Samples specifically taken for radiocarbon dating were {6},{7} and {8}, and should provide sufficient material for the extraction of single entity organic remains suitable for radiocarbon dating by AMS (Accelerator Mass Spectrometry).



### 3.4.6 Molluscs and ostracods

Shells of freshwater molluscs moderately abundant in the flot from sample {5}[5] and rare in {3}[4]. None were seen in sample {2}[6].

### 3.4.7 Plant and insect remains

Charred plant remains were limited to very occasional small flecks/fragments of charcoal seen in all three samples. Samples {3} [4] and {5} [5], contained only very occasional rootlet fragments, and one waterlogged seed in each. A slightly larger assemblage of waterlogged remains was present in sample {2} [6] included seeds of several aquatic and/or wetland species such as sedges (*Schoenoplectus* cf. *lacustris*), spike-rush (*Eleocharis palustris/uniglumis*), rush (*Juncus* sp.) and (*Apium* cf. *nodiflorum*). Occasional seeds of opium(?) poppy (*Papaver* cf. *somniferum*), dyer's rocket (*Reseda luteola*) and stinging nettle (*Urtica dioica*) suggest the additional presence of drier, disturbed ground in the vicinity. All plant remains in this sample were identified and recorded.

In terms of insect remains occasional mites were seen in samples {5} [5] and {2} [6].

sample	context	volume (litres)	retained on-site	processed	chd wood	wlg seeds/fruit	insects	molluscs
2	6	20	15	5	+	++	+	
3	4	20	15	5	+	+		+
4	3	20	15	5				
5	5	20	15	5	+	+	+	++

Table 8 Evaluation of environmental evidence

## 3.5 Assessment of the evaluation

GLAAS guidelines (English Heritage, 1998) require an assessment of the success of the evaluation 'in order to illustrate what level of confidence can be placed on the information which will provide the basis of the mitigation strategy'.

The evaluation has shown that the 19th century East London Waterworks Company reservoir has truncated much of the alluvial deposits within its footprint.

However, evaluation trench PDZ4.28 (OL-06707) exposed gravels of late Pleistocene/early Holocene date, overlain by prehistoric alluvial sequences. These were in turn sealed by historic alluvial deposits beneath substantial depths of made ground.

The results of evaluation trenches PDZ4.08 (OL-06907) and PDZ4.51 (OL-08307) demonstrated that, although partially truncated during its decommissioning, structural remains of the East London Waterworks Company reservoir survived.

The backfill of the reservoir was, as anticipated, 19th century commercial and industrial waste. Unfortunately, due to ground conditions, it was not possible to fully excavate these fills and locate the total depth of the structure.

## 4 Archaeological potential

### 4.1 Realisation of original research aims

The extent to which the evaluation has been able to address the individual research objectives established in the Method Statement for the evaluation is discussed below:

*What is the extent of truncation within the former ELWC reservoir? Do deposits of archaeological interest survive in this area?*

Although it was not possible to excavate fully the total depth of the reservoir at this time, the evaluation has shown that the structure has truncated all deposits to in excess of 1.70m OD (PDZ4.08: OL-06907).

The evaluation has shown that alluvial deposits, where they do survive outside of the footprint of the reservoir, have been recorded at heights of 4.18m OD overlying gravels recorded at 2.08m OD (PDZ4.28: OL-06707). This suggests that all alluvial deposits within the construction footprint of the reservoir have been truncated down to gravel.

*Do Late Glacial deposits exist within the gravels on the site? What is the potential for past environment reconstruction and/or Late Upper Palaeolithic activity in these deposits?*

Late Glacial / Early Holocene sands and gravels were only observed in PDZ4.28 (OL-06707) and were almost level across the base of the trench. Evidence relating to Late Upper Palaeolithic activity was not identified in the trench because water ingress prevented the gravels from being excavated further.

*Did the tributary valley known to exist to the west of the site cross the site itself in the Pleistocene or Holocene and is there evidence for human activity associated with it? What were the characteristics of this valley in the prehistoric and historic periods and what information about the past environment and river regime might be available from it?*

No evidence of the tributary valley known to exist to the west of the site was found across the site.

*Does evidence of prehistoric and historic occupation survive on the site?*

No evidence for prehistoric and historic occupation survives on the site however a dry land surface is likely to have existed on the surface of the gravels which could be dated *terminus ante quem* by dating the base of the overlying organic clays.

*Does the post-medieval / pre-modern land surface survive on the site and what were its characteristics? Can it be related to the evidence of historic maps?*

No evidence for the post-medieval/pre-modern land surface was seen to survive in the area of the evaluation. Only a small area to the east of the reservoir has provided evidence for the survival of alluvial deposits above gravel (PDZ4.28: OL-06707) but no evidence for the survival of these land surfaces was present.

*What is the thickness, date and characteristics of the made ground across the site?*

Outside of the footprint of the reservoir (PDZ4.28: OL-06707) the made ground consists of 0.75m of re-deposited alluvial silt, sand and gravel.

Overlying this was a 2.40m thick dumped deposit of 19th century industrial and commercial waste sealed by a levelling layer for the present concrete slab associated with the 20th-21st century industrial and business parks.

Within the reservoir the backfill consists of in excess of 3.40m of 19th century industrial and commercial waste sealed by a further 2.35m of similar 19th century waste. Overlying this are 20th-21st century levelling deposits for the present concrete slab.

*Are there any hulks of scuttled vessels used in infilling within the ELWC reservoir (as at Chester?).*

No evidence for any hulks of scuttled vessels or ship timbers were present within the infill of the reservoir, although it was not possible to fully excavate these fills during the evaluation at this time.

*Are there any surviving mechanised remains associated with the ELWC reservoir (pumps, engine equipment etc)?*

Trench PDZ4.08 (OL-06907) has provided evidence for the location and survival of the internal pier footings of the reservoirs sluice gate and external wall. It has also shown that truncation has occurred to the structure, probably during its decommissioning and infilling.

Trench PDZ4.51 (OL-08307) has also provided evidence for the survival of structures that may be associated with the reservoir.

## **4.2 General discussion of potential**

Although the reservoir structure had truncated much of the alluvial deposits within its footprint the evaluation has shown that an interesting alluvial sequence survives intact in an area of land that lies between the reservoir to the west and the River Lea to the east (PDZ4.28 : OL-06707).

The alluvial sequence sampled in PDZ4.28 (OL-06707) revealed an episodic sequence of alluvial clays building up across the landscape from c 2m OD through flooding from the River Lea to the east. A possible ephemeral period of hiatus in the flooding was identified in the alluvial sequence the middle of the profile as well as a slow development of clays through probable water table rise at the base directly over the gravels. Both these periods are worthy of closer scrutiny such as microfossil and radiocarbon analysis (see below). Other, less organic blue clay deposits – thought to be essentially flood deposits – could also reflect periods of stabilisation and dry land formation although, through the processes of waterlogging and gleying, have lost much of the evidence for soil formation.

Further information about the local environment might be obtained by examination of environmental micro-and macrofossils preserved in the bulk and monolith samples taken from PDZ4.28 (OL-06707). Pollen analysis of the samples may be able to determine on the age and of the environmental conditions of their deposition but looking at the distribution of species and their preservation. Micromorphological analysis could identify evidence for past soil formation within these deposits that at a microscopic level may have survived the waterlogged gleying process. Radiocarbon dating of plant / organic remains found in the samples would provide evidence to tie

the deposits into an archaeological timeframe. Notably, interpretations suggest that a former tributary valley did not cross the site from the west.

The results of the evaluation also demonstrated that, although partially truncated during its decommissioning, the 19th century East London Waterworks Company reservoir remained generally intact. The backfill of the reservoir, as anticipated, consisted of late 19th century commercial and industrial waste. The 19th century water-related features will assume greater meaning when correlated with other associated finds from the vicinity of PDZ4.

When final stratigraphic interpretations from the site has been tied in to the information recovered from the surrounding area (by inputting the data into the MoLAS-PCA geoarchaeological database for the Olympic Project), linked to historic map evidence and dated it could have potential to contribute to our understanding of the evolving river regime of the Lower Lea.

### **4.3 Significance**

The geoarchaeological evidence seen on the site has been able to provide information that will aid in the understanding of the evolving environment of the Lea Valley. This information is able to contribute to our understanding of the past environment of the site and its surroundings, and will assist in landscape reconstruction models being developed, which is certainly of local significance.

Further work on the environmental samples and records taken from PDZ4.28 (OL-06707) should clarify the age and environments represented. Taken together with the results of other sites within the Olympics footprint, the results have potential to be of regional significance.

Whilst the archaeo-environmental remains preserved on the site are undoubtedly of local significance there is nothing to suggest that they are of regional or national importance.

The significance of the 19th century structures is enshrined in their association with the East London Waterworks activities in the area. When other related finds are analysed along with their context, it will be possible to determine if these finds are significant to the understanding of the company.

## 5 Assessment by EH criteria

The recommendations of the GLAAS 1998 guidelines on *Evaluation reports* suggest that

‘Assessment of results against original expectations (using criteria for assessing national importance of period, relative completeness, condition, rarity and group value) .....’ (Guidance Paper V, 4 7)

A set of guide lines was published by the Department of the Environment with criteria by which to measure the importance of individual monuments for possible Scheduling. These criteria are as follows: *Period*; *Rarity*; *Documentation*; *Survival/Condition*; *Fragility/Vulnerability*; *Diversity*; and *Potential*. The guide lines stresses that ‘these criteria should not...be regarded as definitive; rather they are indicators which contribute to a wider judgement based on the individual circumstances of a case’.<sup>1</sup>

In the following passages the potential archaeological survival described in the initial Assessment document and Section 3 above will be assessed against these criteria.

### *Criterion 1: period*

Taken as a whole, archaeology of the site is not characteristic of any particular period. The Evaluation indicates a multi period site.

### *Criterion 2: rarity*

There is nothing to suggest that any of the likely archaeological deposits are rare either in a national or regional context.

### *Criterion 3: documentation*

Early OS maps and other historical documentation from the 19th and 20th centuries have provided information that can be related to features recorded during the evaluation.

### *Criterion 4: group value*

The landscape features relate to and are part of the wider pattern seen within the Olympic Park and elsewhere in the Lea Valley. Full interpretation is only possible in that context. The post-medieval survival is remnants of part of the spread eastwards from the City of London and the industrialisation of the site area, combined with the management of the water courses within the Lea Valley.

### *Criterion 5: survival/condition*

The evaluation results have demonstrated that (geo)archaeological remains were preserved beneath several metres of modern made ground, although within areas of development will have been truncated to dramatically different levels.

### *Criterion 6: fragility*

Experience from other sites has shown that isolated and exposed blocks of stratigraphy can be vulnerable to damage during construction work.

### *Criterion 7: diversity*

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<sup>1</sup> Annex 4, DOE, Planning and Policy Guidance 16, (1990). For detailed definition of the criteria see that document. Reference has also been made to Darvill, Saunders & Startin, (1987); and McGill, (1995)

Clearly, taken as a whole, the deposits at the site do not represent a diverse and heterogeneous group of archaeological remains of all types and periods. However, this diversity is in itself the product of a random process of vertical and horizontal truncation and separation. There is no reason to suggest that the diversity *per se* has any particular value which ought to be protected.

*Criterion 8: potential*

(The term Potential in this context appears to mean that though the nature of the site, usually below-ground resources, cannot be specified precisely, it is possible to document reasons predicting its existence and importance)

The evaluation has shown that the survival of alluvial deposits, are very limited due to the truncation caused by the construction of the 19th century East London Waterworks Company reservoir.

Further examination of samples already taken from the alluvial deposits on the site hold the potential to enhance current understanding of the natural and manmade environment of this part of the Lea Valley from the early prehistoric to modern periods. Additionally, understanding of the 19th century remains will come from contextualising analysis.

## 6 Proposed development impact and recommendations

It is proposed to construct Spectator Support Buildings, associated with the Olympic and Paralympic Games basketball stadium. Construction of a new land bridge LO3a, with attendant substructures, is also proposed over the North London railway line. The construction methods for these works will disturb and destroy all archaeological deposits within their footprints. Other construction works are planned, though these have been assessed as not impacting upon the archaeological resource (MoLAS-PCA, 2007b).

The assessment above (Section 5) does not suggest that preservation *in situ* would be an appropriate mitigation strategy. MoLAS-PCA considers that earlier deposits survive beneath 19th and 20th century made ground deposits outside of the footprint of the 19th century reservoir, which are of little importance for archaeological finds and features but have good palaeoenvironmental potential.

No further excavation is required. However, it is recommended that further work be undertaken on the samples already taken from the sequence to gain a better understanding of the local river regime and evolving past landscape.

In order to clarify the potential of the samples taken and to refine the research aims they might be able to address, it is recommended that:

- The unprocessed samples are processed by paraffin flotation for the assessment of insect remains;
- The snail assemblages from the wet-sieved fractions of the samples already processed are assessed;
- Three radiocarbon dates are obtained by AMS on identified twigs, seeds or other plant material likely to have received its carbon from atmospheric sources;
- The stratigraphic, dating and sample assessment data is entered into the MoLAS-PCA geoarchaeological stratigraphic database and used to update the current GIS themes;
- Research aims that might realistically be addressed by the samples are identified.

It is also recommended that the results of this evaluation and of the proposed environmental mitigation are assimilated into a site-wide assessment of all archaeological interventions to assign contextual significance and further refine the importance of the archaeological survival, and thereafter assimilated into any publication discussing/disseminating the results.

The decision on the appropriate archaeological response to the deposits revealed within the evaluation rests with the Local Planning Authority and their designated archaeological advisor (GLAAS).



## **7 Acknowledgements**

MoLAS-PCA would like to thank Capita Symonds Ltd for commissioning this report, and David Divers (English Heritage GLAAS) for monitoring the project on behalf of the London Borough of Hackney.

The author would like to thank Michael Tetreau, Frank Zwettler, Adele Pimley, Stephen White, Kasia Olchowsko, Bilyana Milevska, Mark Ingram, Margaret Feryok, Georgina Pascoe, Anthony Morrin, Paul McGaraty, Matt Edmunds, Rick Archer and Tristram Adfield for their on-site assistance, Jeremy Rogers and Phil Frickers for site surveying, Gary Brown for his project management, and to Sandra Rowntree for work on the illustrations; Raoul Bull and Kieron Tyler for project management and editing. MoLAS-PCA geoarchaeologists Jane Corcoran, Virgil Yendell and Graham Spurr worked on the site and contributed to the text of this report. In addition, thanks are due to the construction team (Edmund Nuttall Ltd) for their cooperation and assistance during the project.



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Environmental Statement

ODA, 2007c Olympic, Paralympic and Legacy Transformation Planning Applications  
Supplementary Information: Environmental Statement Regulation 19 Further  
Information and Supplement (Document no. OLY/GLB/ACC/DOC/ENV/SUP/01A)

ODA, 2007d Olympic, Paralympic and Legacy Transformation Planning Applications  
Annexure Code of Construction Practice, Vol 15 (Document no.  
OLY/GLB/ACC/DOC/CCP/01)

## 9 Appendix 1: NMR OASIS archaeological report form

**OASIS ID: molas1-40689**

### Project details

Project name	Olympic Development, Planning Delivery Zone 4, Work Package 3.
Short description of the project	The results of the evaluation trenches have provided information on the position, construction and survival of the 19th century East London Waterworks Company reservoir that covers most of the evaluation area. In the east, trench PDZ4.08 located the pier bases for the reservoirs sluice gate and also a section of its eastern wall. The trench also provided information that suggests that, although partially truncated during its decommissioning, the 19th century East London Waterworks Company reservoir remains generally intact. The backfill of the reservoir consists of late 19th century commercial and industrial waste. To the north, trench PDZ4.25 has provided information on the depth of truncation caused by the construction of the reservoir and the nature of its backfill deposits. To the south, trench PDZ4.51 has located a 19th century brick drain or channel structure that may be associated with the reservoir and water management in the area. Although the reservoir structure has truncated much of the alluvial deposits within its footprint, the evaluation trench PDZ4.28 has shown that an interesting alluvial sequence survives intact in an area of land that lies between the reservoir to the west and the River Lea to the east.
Project dates	Start: 02-10-2007 End: 01-02-2008
Previous/future work	No / Not known
Any associated project reference codes	OL-06907 - Sitecode
Any associated project reference codes	OL-06707 - Sitecode
Type of project	Field evaluation
Site status	Local Authority Designated Archaeological Area
Current Land use	Industry and Commerce 1 - Industrial
Monument type	RESERVOIR Post Medieval
Significant Finds	POTTERY Post Medieval
Methods & techniques	'Environmental Sampling','Targeted Trenches'
Development type	Public building (e.g. school, church, hospital, medical centre, law courts etc.)
Development type	Land reclamation/de-contamination
Development type	Olympic development
Prompt	Planning condition
Position in the planning process	After full determination (eg. As a condition)

### Project location

Country	England
Site location	GREATER LONDON TOWER HAMLETS TOWER HAMLETS Olympic Development, Planning Delivery Zone 4, Work Package 3.
Postcode	E15
Study area	0.24 Kilometres
Site coordinates	TQ 53727650 18458955 50.9444710607 0.188511614174 50 56 40 N 000 11 18 E Point
Site coordinates	TQ 53762212 18457963 50.9444529031 0.189002846467 50 56 40 N 000 11 20 E Point
Site coordinates	TQ 53737738 18395951 50.9439021607 0.188628520059 50 56 38 N 000 11 19 E Point

### Project creators

Name	of MoLAS/PCA
Organisation	
Project originator	brief MoLAS project manager
Project originator	design MoLAS/PCA
Project director/manager	Nick Bateman
Project supervisor	Paul Thrale
Type sponsor/funding body	of ODA

### Project archives

Physical recipient	Archive	LAARC
Physical ID	Archive	OL-06907
Physical Contents		'Ceramics'
Digital recipient	Archive	LAARC
Digital Archive ID		OL-06907
Digital Contents		'Ceramics','Environmental','Survey'
Digital available	Media	'Images raster / digital photography'
Paper recipient	Archive	LAARC
Paper Archive ID		OL-06907
Paper Contents		'Environmental'
Paper available	Media	'Context sheet','Plan','Report','Section'

Entered by Paul Thrale (molas.archive@museumoflondon.org.uk)  
Entered on 15 April 2008

## 10 Appendix 2: OL-06907 Finds

### 10.1 The pottery

*Lyn Blackmore*

Post-Roman pottery	4.274 kg	32 sherds, 30 vessels, 4274g
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*Table 9 Post-Roman pottery summary*

An assemblage of 19th-century pottery was recovered from three contexts on the site (Table 9); most sherds are of average size or larger and in good condition.

The pottery was examined macroscopically and using a binocular microscope (x 20) where appropriate, and recorded on paper and on the MoLAS Oracle database using standard Museum of London codes for fabrics, forms and decoration. The numerical data comprises sherd count, estimated number of vessels and weight.

#### 10.1.1 *Fabrics and forms*

The pottery mainly comprises stonewares (15 sherds) and industrial finewares (14 sherds). The former include sherds from up to eight cylindrical jars with ‘Bristol’ glaze that would have been used for jar and/or marmalade. One of these, from [3], is stamped ‘HARTLEY LONDON & LIVERPOOL around the edge of the base, with a lighthouse at the centre, while another, from [11], is stamped ‘WP HARTLEY TRADEMARK REG’. Others have vertically ribbed panels or single vertical lines at intervals around the body.

The other sherds are mainly from large jars, but one is from part of a tap (often referred to in the literature as a ‘stone cock’), possibly from a beer barrel (cf Green 1999, 176, fig 142, no.437). This is moulded, the handle being straight-sided with rounded ends with a recessed circle at the centre of the concave surface; similar forms are illustrated in the catalogue of Stiff and Sons, 1873 (ibid, 368). The shaft is hollow, with a single band of beaded decoration near the junction with the handle; it has broken at the point where it is perforated so that the liquid could pass through. The handle and upper part of the shaft are ‘Bristol’ glazed, but the part that would have been hidden in the tap itself is unglazed. Also present is a complete tall ink bottle with spouted (lipped) rim (cf ibid, 368).

The industrial finewares mainly comprise refined white earthenware. Four sherds are from cylindrical jars similar to the above, one with a stamped base; this is partly illegible, but reads ‘MA... F NEWCASTLE’ ([11]); also present is the complete lid of a jar ([11]). Tablewares include a plate and two cups with slipped decoration or gilding. Also present are part of a bone china dessert plate with overglaze painted decoration ([11]) and sherds from to transfer-printed lids ([3]). Other finds comprise part of a mixing bowl in slipped yellow ware and the base of a large redware vessel that may have been used as a mortar (rim missing ([11])).

### 10.1.2 Discussion

The 11 sherds of pottery from [2] and [3] (1.269kg) are from dumped layers in Trench PDZ4.25 and date these deposits to after 1805 and 1825 respectively. The 21 sherds from [11] were associated with a wall in trench PDZ4.51 and date this structure to finds to after 1830.

### 10.1.3 Outstanding work

The pottery is of use for dating but of limited potential for the interpretation of the site as it derives from only three contexts and all the finds are of similar date. The stoneware handle from [11], however, could be illustrated. Beyond this, no further work is recommended.

## 10.2 Small finds

*Beth Richardson*

Accessioned finds	5 items
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### *Table 10 Accessioned finds summary*

The accessioned finds were examined by a specialist for assessment. They are listed below by context.

### 10.2.1 Categories by dating and materials

[2] <1> Teapot. Small teapot, cast iron hollow ware with a white fired enamel coating; 20th century

[2] <2> Teapot. Bell-shaped teapot, cast iron hollow ware with a fired enamel coating in a (discoloured) 'narrowboat' or 'canal ware' ware pattern; 20th century

[2] <3> Perfume bottle. Mould-made rectangular bottle with fluted decoration. Late 19th or 20th century

[11] <\*> Tumbler. Base and body from a clear lead glass tumbler; mid 19th to early 20th century

### 10.2.2 Discussion

These finds are very recent, probably dating to the early 20th century. If they are closely dated by ceramics and/or stratigraphy the finds from [2] could be photographed and published as a group.

### 10.2.3 Outstanding work

The data is of local significance only and no further work is recommended. No objects were identified as requiring conservation work for investigation and analysis.

## 10.3 Leather

*Beth Richardson*

Bulk leather	1 bag
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*Table 11 Bulk leather summary*

The unstratified leather from Trench PDZ4.25 was conserved (freeze dried), and examined for assessment by a specialist.

### 10.3.1 Categories by dating and materials

The leather from PDZ 4.25 consists of eight pieces from an adult's shoe. The leather is in poor condition, brittle, fragmentary and iron-stained. The surviving parts consist of a stacked heel, the instep from a sole and five pieces of upper with machine stitching and copper eyelets for laces. There are fragments of laces in the eyelets.

This is an Oxford or Derby style shoe, laced down the front. The machined stitching dates it to the mid 19th century or later. It may be 20th century.

### 10.3.2 Discussion

Nineteenth and early 20th century footwear is rarely published; an exception is a small group of substantially complete 19th century footwear from Reading published by Quita Mould (Mould in Hawkes and Fasham 1997).

### 10.3.3 Outstanding work

The shoe is fragmentary and incomplete; if it proves to be closely datable (from ceramics and/or stratigraphy) it may have publication potential; otherwise, archive potential only. No objects were identified as requiring conservation work for investigation and analysis.



## 11 Appendix 3: Glossary

**Alluvium.** Sediment laid down by a river, and usually well-sorted. Can range from sands and gravels deposited by fast flowing water and clays that settle out of suspension during overbank flooding. Other deposits found on a valley floor are usually included in the term alluvium. Peat develops when there is little mineral sediment deposition and impeded drainage, which limits biological decay; and tufa accumulates when springs rich in calcium carbonate discharge in damp well-vegetated situations.

**Arctic Beds.** Cold climate deposits, pre-dating the Last Glacial Maximum and sometimes found within the gravels of the Lower Lea. They may survive within parts of the floodplain not reworked by the river during the Late Glacial.

**Ecotone.** A zone that lies between areas of contrasting environment, such as on the wetland/dryland margins.

**Holocene.** The most recent epoch (part) of the Quaternary, covering the past 10,000 years during which time a warm interglacial climate has existed. Also referred to as the 'Postglacial' and (in Britain) as the 'Flandrian'.

**Knickpoint.** A fall in base level (such as the low sea level at the end of the Pleistocene) gives rise to a discontinuity in the longitudinal profile of a river ie: steepening of the downstream channel gradient. The river tends to adjust to such a change by increased flow, which leads to increased erosion in the steepened section of the river and this results in the steepened section (knickpoint) cutting back in an upstream direction.

**Last Glacial Maximum.** The height of the glaciation that took place at the end of the last cold stage, around 18,000 years ago.

**Late Glacial.** The period following the Last Glacial Maximum and lasting until the climatic warming at the start of the Holocene. In Britain this period is subdivided into a warm 'interstadial' episode the Windermere Interstadial, followed by a renewed cold ('stadial') episode, in which local ice advances occurred (the Loch Lomond Stadial).

**Pleistocene.** Used in this report to refer to the earliest part of the Quaternary, the period of time until the start of the Holocene, about 10,000 years ago. However, since the present Holocene epoch is almost certainly only a warm interglacial episode within the oscillating climate of the Quaternary, it is often seen as being part of the Pleistocene epoch, in which case the terms Pleistocene and Quaternary are interchangeable. As it is necessary, in this report, to differentiate between the events that took place at various times during the last cold stage and earlier in the Quaternary and those that took place during the Holocene, the Pleistocene is used to refer to the parts of the Quaternary pre-dating the climatic amelioration that took place at the start of the Holocene.

**Quaternary.** The most recent major sub-division (period) of the geological record, extending from around 2 million years ago to the present day and characterised by climatic oscillations from full glacial to warm episodes, when the temperature was as warm as if not warmer than today. To a large extent human evolution has taken place within the Quaternary period.

**12 Appendix 4: Context index: OL-06907**

Context No.	Trench	Plan	Section/ Elevation	Type	Description
1	PDZ4.25		1	Layer	Late 19th - 20th century sandy, silt
2	PDZ4.25		1	Layer	Late 19th - 20th century silty clay
3	PDZ4.25		1	Layer	Late 19th - 20th century clayey silt
4	PDZ4.25		1	Fill	19th – 20th century stone post packing of post hole [5]
5	PDZ4.25		1	Cut	Post hole
6	PDZ4.25		1	Timber	Post (remains of decayed timber post)
7	PDZ4.25		1	Layer	Re-deposited alluvial Silt and clay
8	PDZ4.25		1	Layer	Re-deposited gravel
9	PDZ4.25			Layer	Re-deposited alluvial sandy, clay and silt
10					Not used
11	PDZ4.08		1	Deposit	Late 19th century commercial and industrial waste
12	PDZ4.08		1	Deposit	Late 19th century commercial and industrial waste (Backfill of reservoir)
13	PDZ4.08	Trench	1	Structure	Pier base for 19th century reservoir sluice gate
14	PDZ4.08	Trench		Structure	Pier base for 19th century reservoir sluice gate
15	PDZ4.08	Trench		Structure	Wall of 19th century reservoir
16	PDZ4.08	Trench		Cut	U/R Construction cut for wall [15]
17	PDZ4.08	Trench		Deposit	Re-deposited layer or fill of cut [16]
18					Not used
19					Not used
20					Not used

### 13 Appendix 5: Context Index: OL-06707

Context No.	Trench	Plan	Section/ Elevation	Type	Description
1	PDZ4.28		1	Layer	Re-deposited alluvial silt
2	PDZ4.28		1	Layer	Re-deposited sand and gravel
3	PDZ4.28		1	Layer	Alluvial silty clay
4	PDZ4.28		1	Layer	Organic alluvial deposit
5	PDZ4.28		1	Layer	Alluvial clay deposit
6	PDZ4.28		1	Layer	Organic alluvial deposit
7	PDZ4.28		1	Natural	Sandy gravel deposit

**14 Appendix 6: Context Index: OL-08307**

Context No.	Trench	Plan	Section/ Elevation	Type	Description
1					Not used
2					Not used
3					Not used
4					Not used
5					Not used
6					Not used
7					Not used
8	PDZ4.51		1	Layer	19th-20th century Silty clay
9	PDZ4.51		1	Fill	Orange/brown clayey silt fill of water channel structure
10	PDZ4.51		1	Fill	Dark grey clayey silt fill of water channel structure
11	PDZ4.51	11		Structure	North wall of 19th century brick channel structure
12	PDZ4.51	11		Structure	Brick floor of channel structure
13	PDZ4.51	11		Structure	South wall of 19th century brick channel structure
14	PDZ4.51	11		Layer	Silty clay deposit
15	PDZ4.51	11		Layer	Silty clay deposit

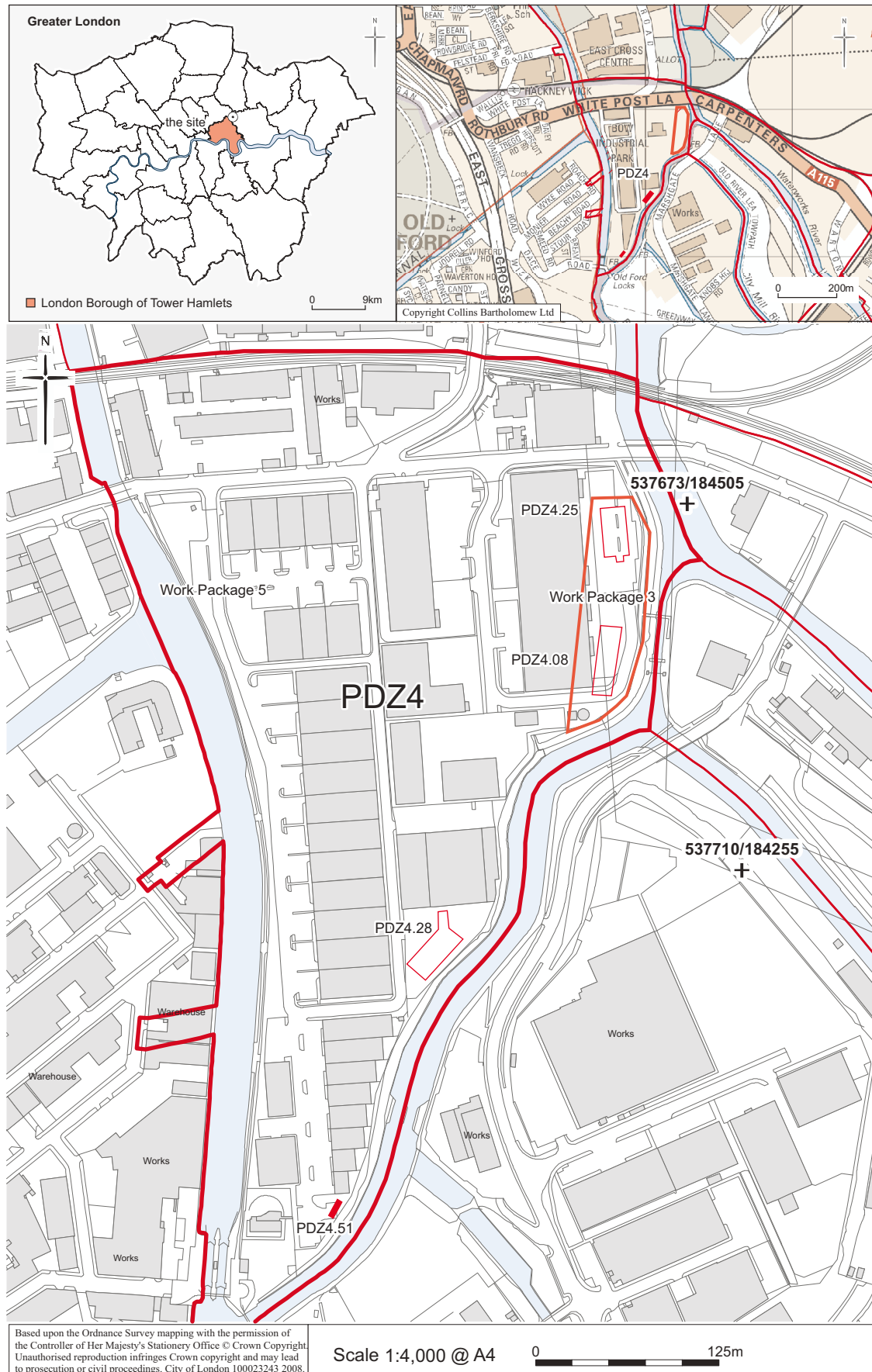


Fig 1 Location map

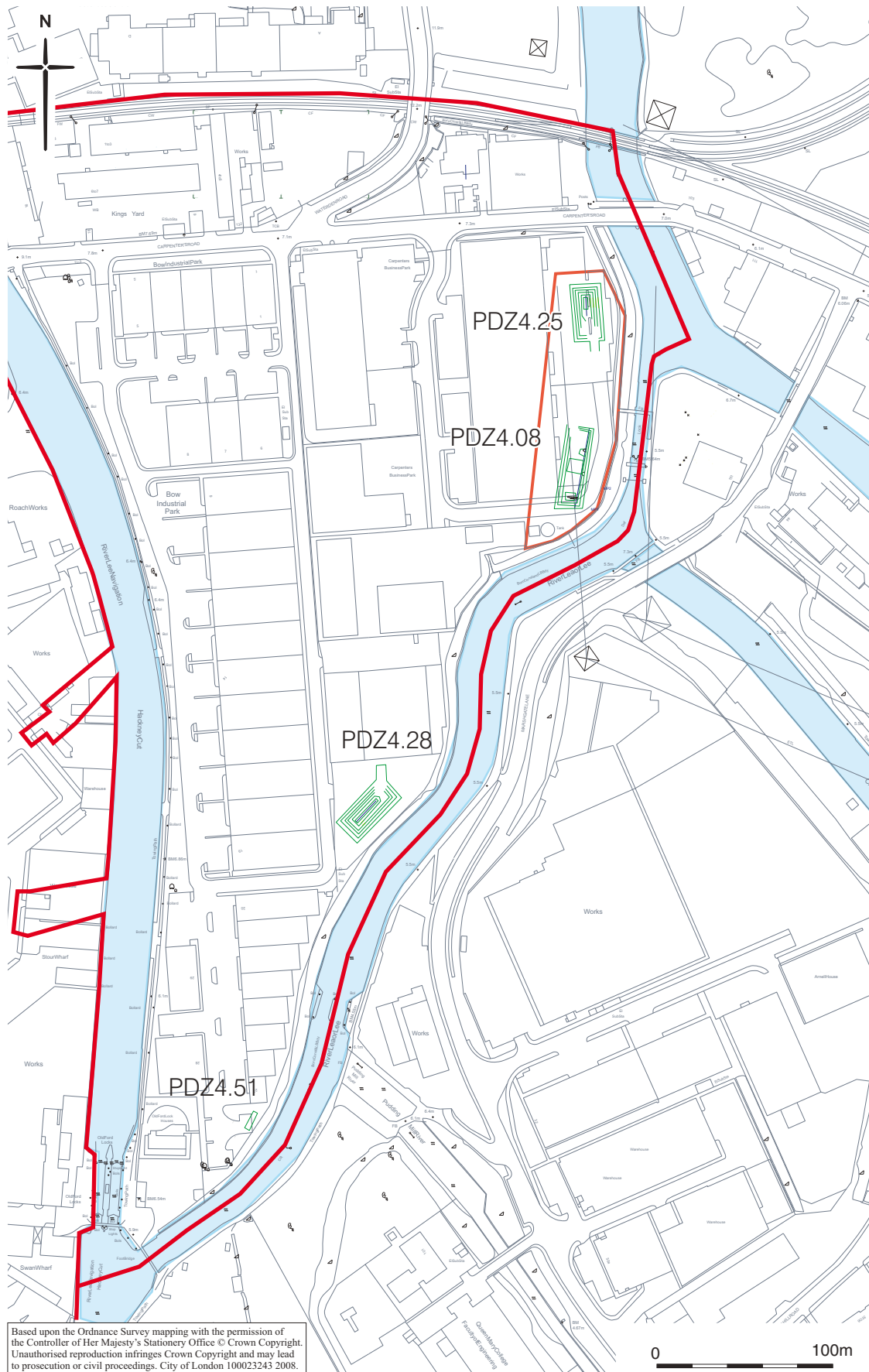


Fig 2 Trench locations



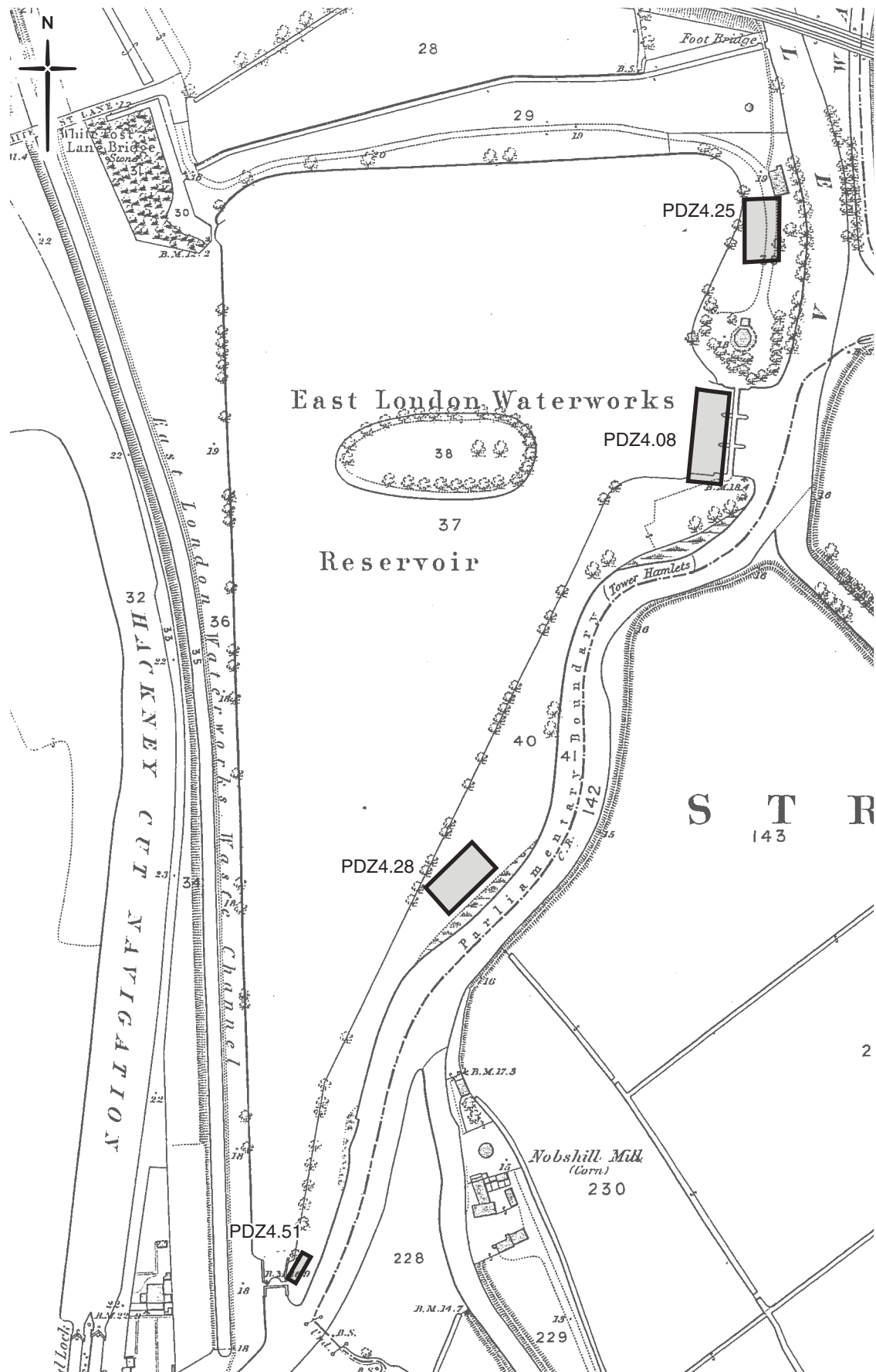


Fig 3 Detail from the 1st edition 1867 OS map of Stratford (15 inches to a mile)



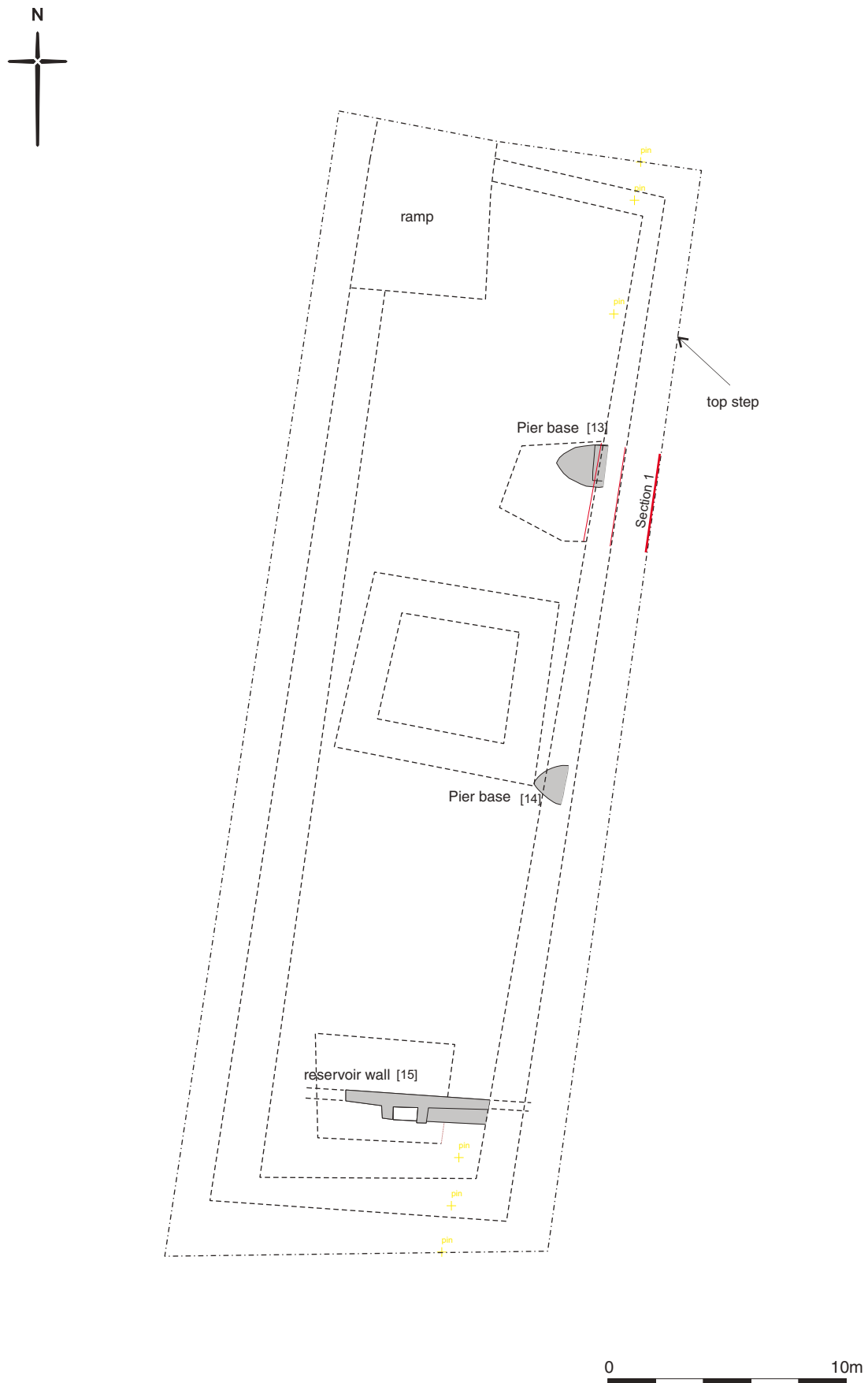


Fig 4 Plan of Trench PDZ4.08

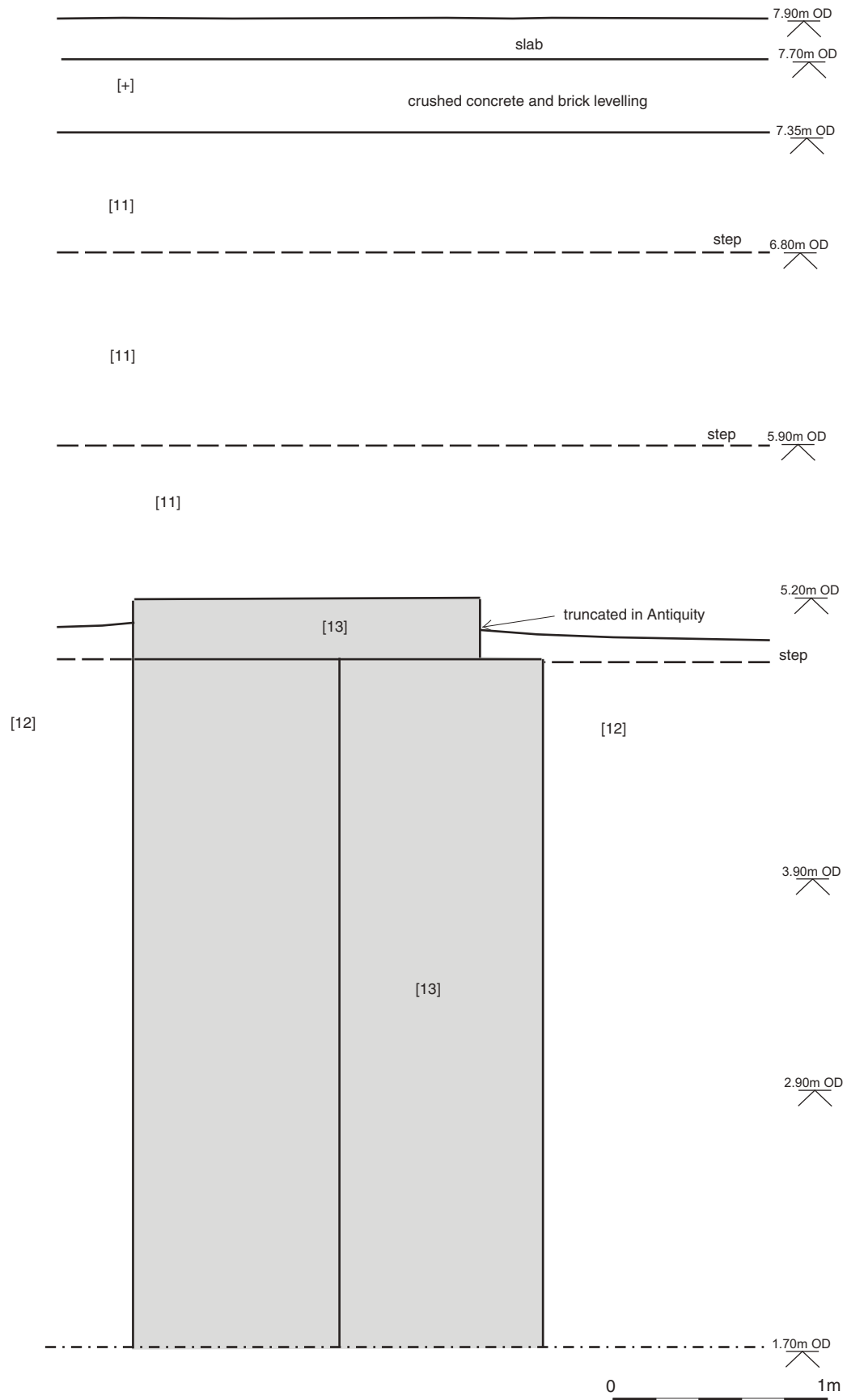


Fig 5 West facing Section 1 of Trench PDZ4.08



Fig 6 Photograph of Trench PDZ4.08, looking south, showing pier bases of 19th century reservoir sluice gate and E-W aligned reservoir wall [15]



Fig 7 Photograph of Trench PDZ4.08, looking east, showing details of reservoir wall [15]





Fig 8 Photograph of Trench PDZ4.08, looking east, showing detail of pier base [13]



Fig 9 Photograph of Trench PDZ4.08, looking east, showing excavation of pier base [13]

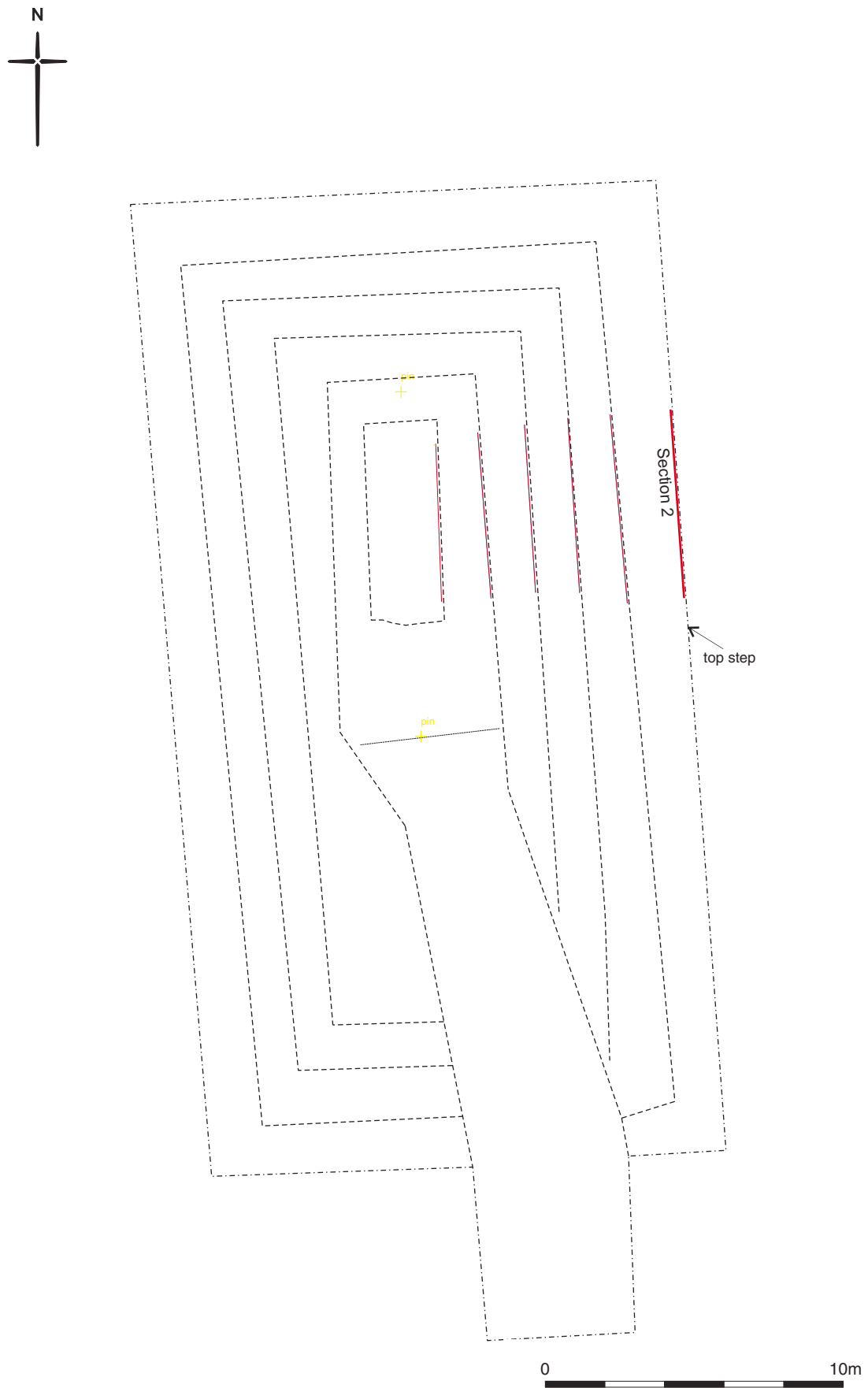


Fig 10 Plan of Trench PDZ4.25

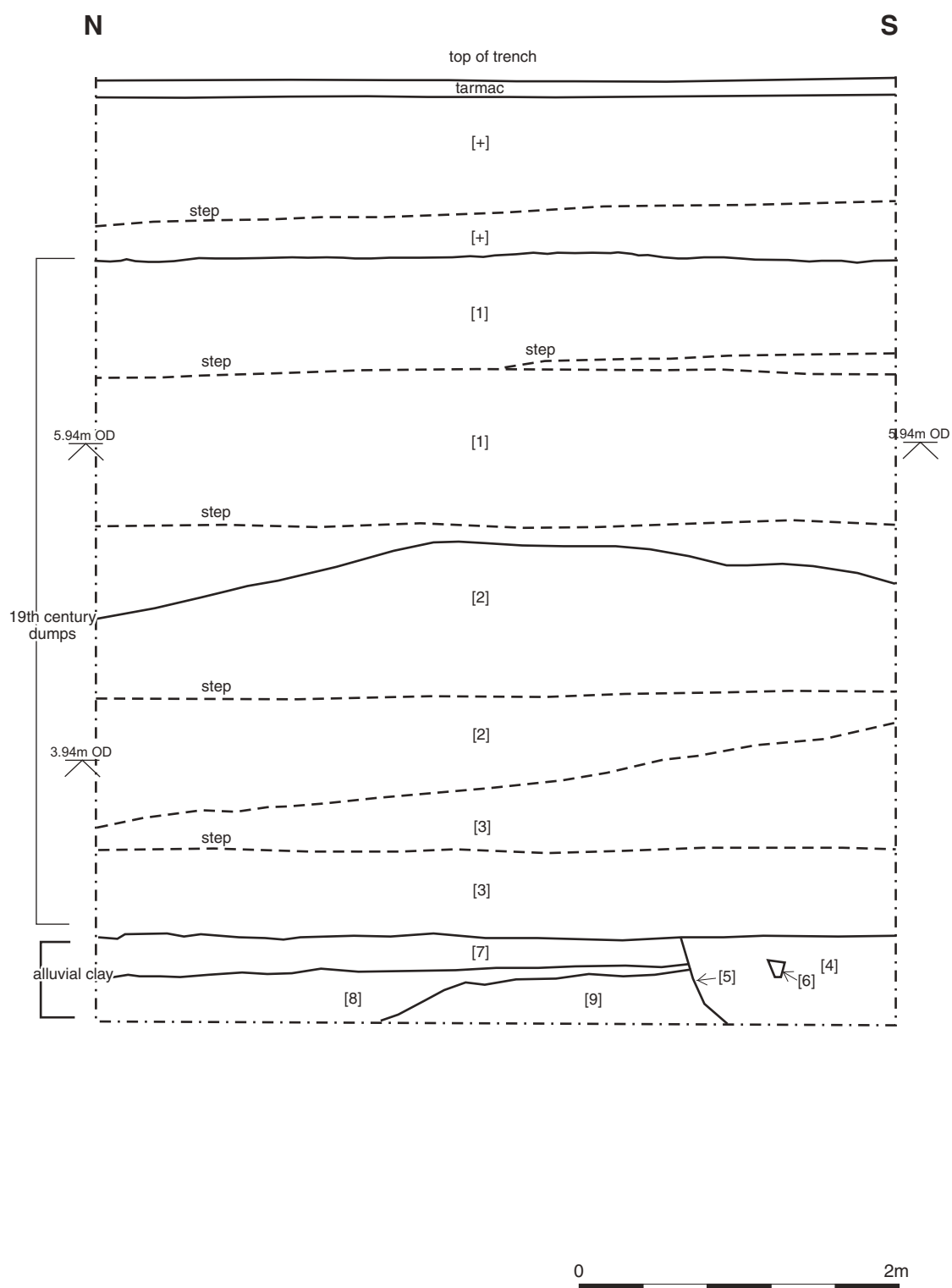


Fig 11 West facing Section 2 of Trench PDZ4.25

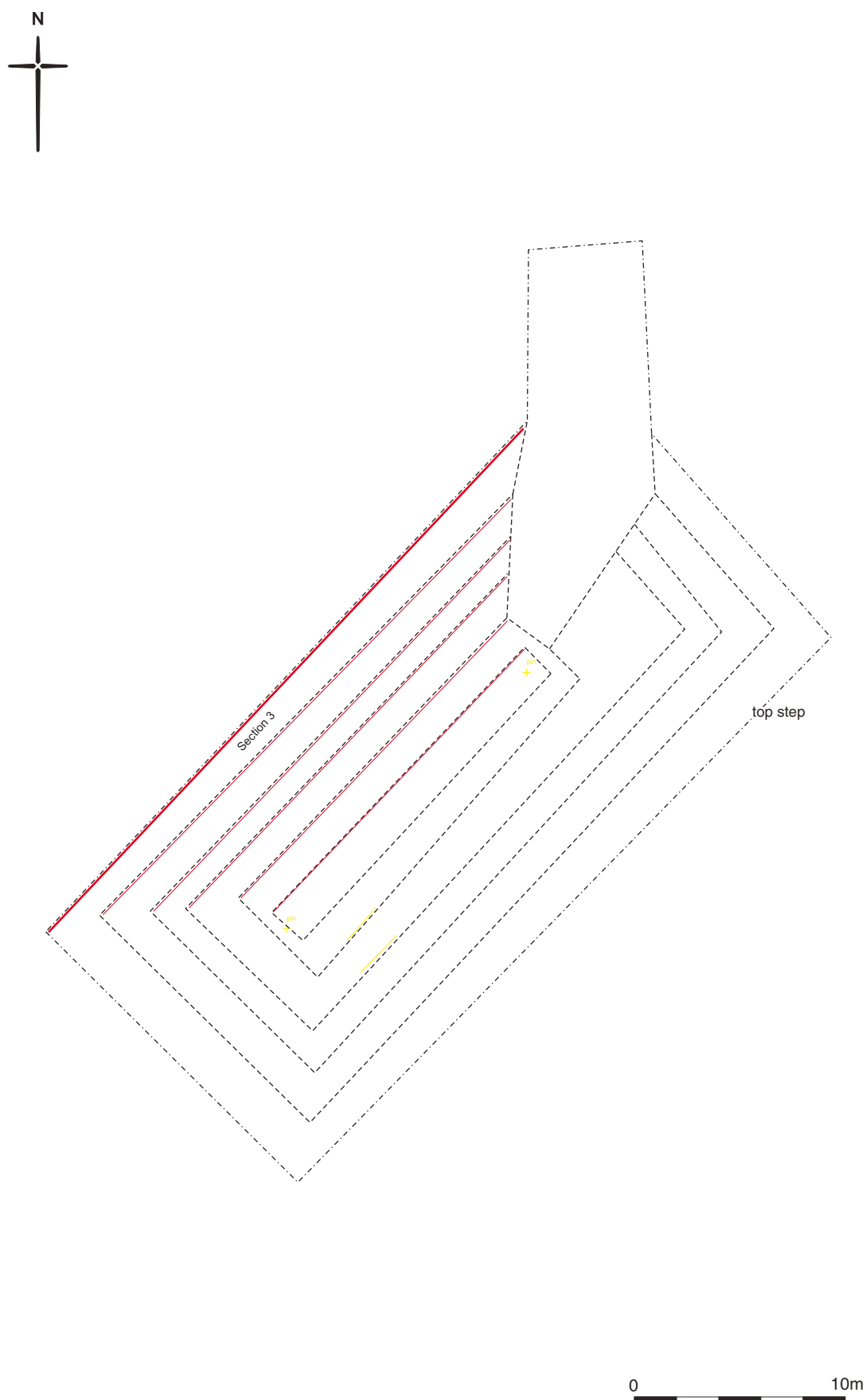


Fig 12 Plan of Trench PDZ4.28



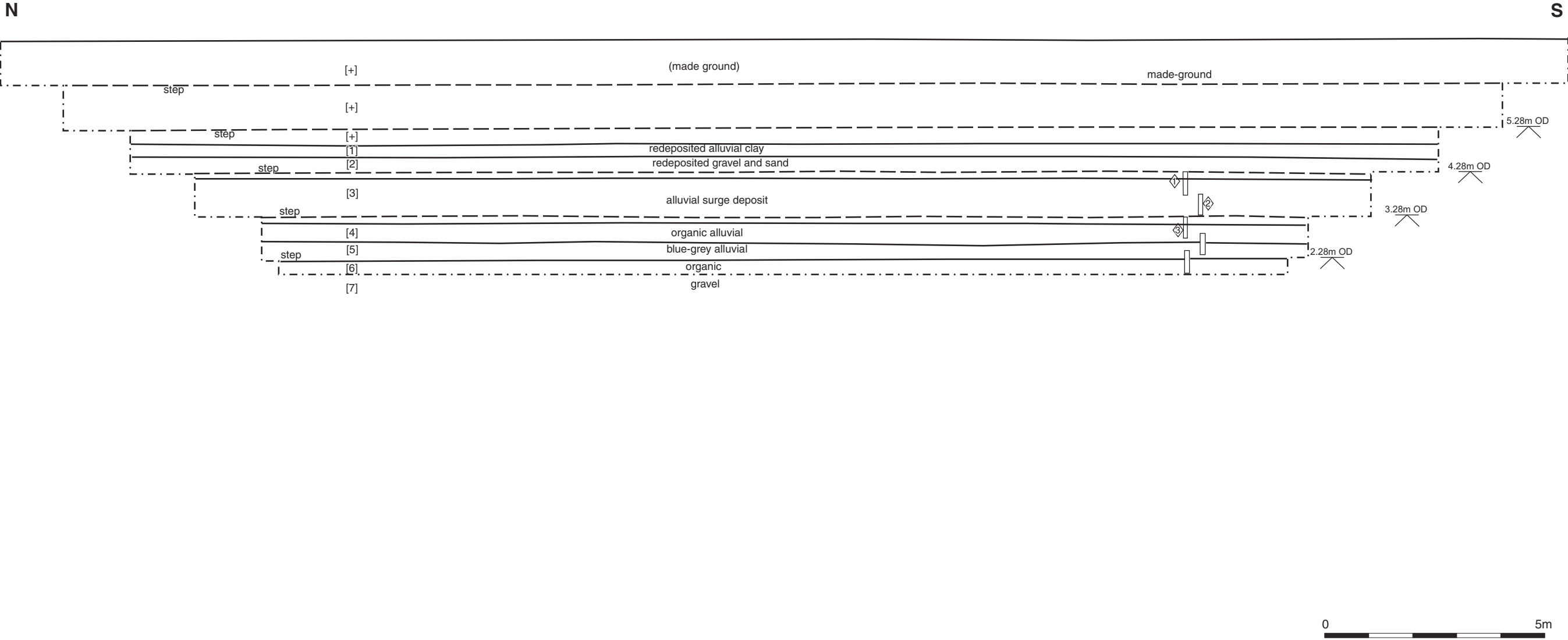


Fig 13 South facing Section 3 of Trench PDZ4.28

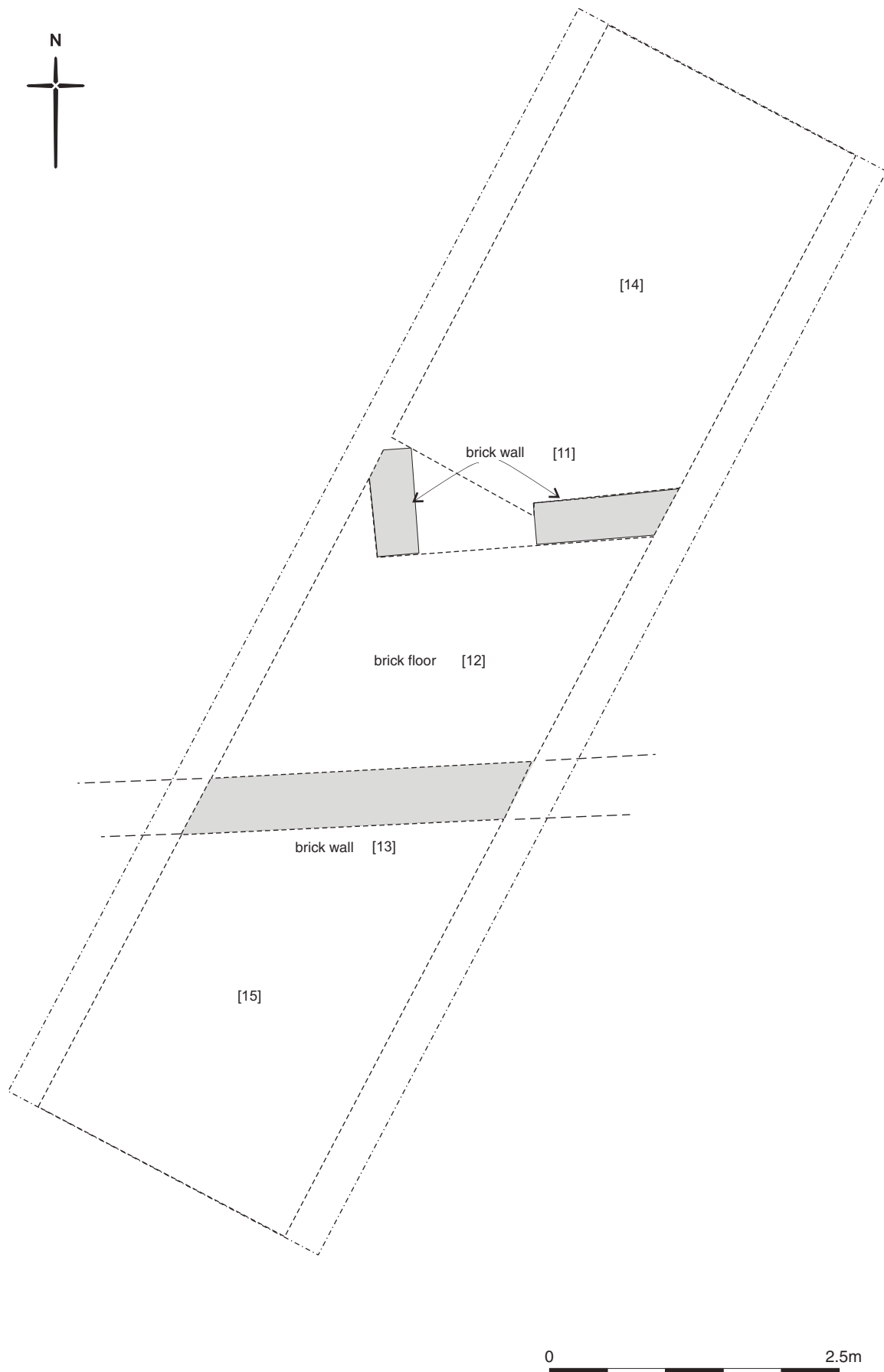


Fig 14 Plan of Trench PDZ4.51