



PLANNING DELIVERY ZONE 4  
Work Package 2  
Trenches PDZ4.10  
PDZ4.30  
PDZ4.31

E15

London Borough of Tower Hamlets

An archaeological evaluation report

July 2008



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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 the Work Package 2 site 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 PDZ4.10 and PDZ4.30 were excavated on the site. Excavation of Trench PDZ4.31 began, but was halted and then discontinued.– after consultation with relevant parties – due to health and safety concerns.*

*The two trenches (PDZ4.10 and PDZ4.30) were excavated to the level of the natural gravels. These deposits were overlain by an alluvial sequence (ranging from 0.90-1.35m in thickness) with preliminary interpretations suggesting that the site lies outside the tributary valley known to exist to the west. However, near channel mudflats or foreshore deposits were found that could relate to the tributary valley lying to the west or to a later watercourse. These deposits are as yet undated and, due to their elevation could also be a result of stabilisation and dry land formation that was later waterlogged and, as a result of the gleying process lost much of the most apparent evidence of soil formation.*

*The alluvial deposits were recorded and sampled by a geoarchaeologist. Preliminary evaluation of the samples has indicated that some potential of environmental remains, including snails, ostracods and plant remains exists, with organic material suitable for radiocarbon dating and potential for the survival of microfossils, such as diatoms and pollen.*

*The alluvial deposits were then sealed by 19th-20th century made ground or landfill deposits, above which was either concrete or laid topsoil.*

*No evidence for historic or prehistoric occupation was present in the two evaluation trenches.*

*The results of the field evaluation have helped to refine the initial assessment of the archaeological potential of the site. The absence of cultural features suggests that the site has a low archaeological significance. However, the natural deposit sequence renders it integral to the understanding the natural formation and change of the lower Lea Valley. The samples and records obtained from the trench are of considerable environmental significance, as they are likely to provide evidence for changes in the prehistoric and later river regime and floodplain topography. 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 archaeo-environmental work on the samples and records already taken from the site would provide adequate mitigation of the archaeological resource.*

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# 1 Introduction

## 1.1 Site background

Three evaluation trenches (Trenches PDZ4.10, 4.30 and 4.31) were excavated within Work Package 2 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). 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 the site. Work Package 2 was located within the north-east corner of PDZ4.

The OS National Grid Reference for the site centre is 537570 184570. The footprint of work package 2 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 2 was delimited as a tool for defining the location and potential maximum extent of the group of trenches (Fig 1).

Ground level within the site varies from 7.60-7.68m OD. Ground level immediately adjacent to the site lies at *c* 7.30m OD (Carpenters Road). The site code is OL-06607.

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 exercise 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 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/OUMODA and Site Preparation Planning Application Reference 07/90011/FUMODA. Condition SP.0.38 of planning permission 07/90011/FUMODA 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).

- 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 landsurface survive on the site and what were its characteristics? Can it be related to the evidence of historic maps?
- What is the thickness, date and characteristics of the made ground across the site?
- 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-00305). 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 landsurface 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**

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* 1847–48, the East London Waterworks Company constructed a large triangular reservoir in PDZ4, immediately south of the site. 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.

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.

Constructed around the turn of the century Carpenter's Road is depicted by the 1914 OS map crossing the northern end of PDZ4 and on the northern side of this is a complex of buildings marked 'Clarnico Works' (the factory buildings are still extant within the area covered by PDZ4, work package 1). Some of the buildings north of the Carpenter's Road are indicated to have been damaged beyond repair by the LCC bomb damage maps, compiled at the end of WWII.

## 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 proposed development (PDZ 4.10 and PDZ4.30) (Fig 2).

A third evaluation trench (PDZ4.31), located to the immediate east of Trench PDZ4.30, was abandoned for health and safety reasons. Excavation of Trench PDZ4.31 began during the week commencing 12 November 2007. The top of the trench measured 30m x 30m. On 19 November, the contactors (Edmund Nuttall) began excavating the made ground from the north-west side of the trench to the south-west side, to 1m deep. When the south-west corner was reached, a gas smell was noticed. It was necessary to establish whether it was safe to continue: samples were taken from the trench by Halcrow for testing. On 20 November the gas smell was still apparent. On 21 November the trench was excavated by the contractors to a depth of 2m from the ground surface stepping in from the north-west to south-west: due to heavy rain the trench became flooded. Again the gas was apparent, so excavation was abandoned by the contractors. On 27 November Halcrow returned to the trench; the air quality was still poor. After discussion between MoLAS-PCA and English Heritage, it was agreed to abandon the trench on 29 November 2007. Trench PDZ4.31 is located on Fig 1 and Fig 2, beyond which it is not discussed further in this report.

Both Trenches PDZ4.10 and PDZ4.30 were excavated to the base of the archaeological sequence, with machining of trenches completed in stages in cases where archaeological features were encountered within the sequence (Fig 2). 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. MoLAS-PCA geoarchaeologists visited the trenches during excavation to examine and interpret the deposits in plan and section and to take samples as appropriate.

Work on Trench PDZ4.10 began in the week ending 8 October 2007 and was completed in the week ending 12 October. Trench PDZ4.30 began in the week ending 16 November and was completed in the week ending 21 November.

The locations of the evaluation trenches were recorded 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 Morrison's engineers, imported onto the site.

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). The site has produced: trench plans at 1:50 scale; 11 context records; and

sections at scales of 1:20 and 1:50 and a number of environmental samples (three 20ltr bulks, plus two monoliths). The site records will be deposited under the site code OL-06607 in the LAARC.

### 3.2 Results of the evaluation

(See Fig 2 for trench locations).

#### 3.2.1 Trench PDZ4.10

Location	North side of Carpenters Road at junction with Waterden Road.
Dimensions	18m E/W by 12.50m N/S and excavated to a total depth of 5.50m
Modern ground level	7.60m OD
Base of modern fill	5.30m OD
Depth of archaeological deposits seen (alluvium)	0.90m (Alluvial clay)
Level of base of deposits observed and/or base of trench	2m OD
Natural observed	2m OD (Gravels)

*Table 1 Trench PDZ4.10 deposit summary*

See Fig 3 and Fig 4.

The trench, which was located on the north side of Carpenters Road at the junction of Waterden Road, was machine excavated to a depth of 5.50m. Gravels [2] were recorded at the base of the trench at a height of 2m OD and represents natural sand and gravel deposits (which may be of a Pleistocene or Holocene date).

Overlying this was a 0.90m thick layer of clay [1] recorded at a height of 2.90m OD. This represents probable seasonal flooding deposits associated with rising river levels probably linked to RSL rise and increased run off as a result of human activity within the catchment. The blue grey colouring indicates poor drainage and anaerobic conditions (gleying) as river level rises. The absence of any visible weathering of the alluvial deposits and the insect remains suggests that they were almost constantly inundated or that later periods of drying out have been truncated or subject to some form of post-depositional alteration, such as.

Above this was a 0.15m thick layer of silty, organic clay [5] that contained fragments of 19th century CBM. This was sealed by a 0.70m thick layer of re-deposited alluvial clay [4] recorded at a height of 3.80m OD. Overlying this, and recorded at a height of 5.10m OD, was a 1.30m thick layer of re-deposited clay and silt [6]. Both these deposits contained occasional fragments of post-medieval CBM (brick). Above this was a 0.15-0.20m thick layer of sandy clay and silt [3] containing frequent root action. This layer, which was recorded at a height of 5.30m OD, may represent either one of many sequences of 19th century re-deposited material or a buried soil horizon prior to commercial and industrial dumping.

Above this was 2.50m of mixed 19th and 20th century dumping and sealing this was a 0.20m thick mixed layer of topsoil, roots and brick and concrete crush that represents the present ground surface and was recorded at a height of 7.60m OD.

Bulk samples and a monolith tin sample were taken from the alluvial and gravel sequence at the base of the trench by members of staff from the MoLAS Geo-archaeological department.

The evaluation has shown that in the area of the trench no archaeological deposits have survived above alluvial clay apart from a possible 19th-century buried soil horizon. The evaluation has also provided no evidence for the presence of archaeological activity in the area of the trench beneath these flood deposits.

### 3.2.2 Trench PDZ4.30

Location	North side of Carpenters Road west of junction with Waterden Road
Dimensions	24m E/W by 17.50m N/S
Modern ground level	c 7.68m OD
Base of modern fill	3.34m OD (bottom of 19th century dumping)
Depth of archaeological deposits seen (alluvium)	1.30m
Level of base of deposits observed and/or base of trench	2.02 OD
Natural observed	2.02m OD

Table 2 Trench PDZ4.30 deposit summary

See Fig 5 and Fig 6.

A slightly silty gravel deposit [14] was recorded at the base of the trench at a height of 2.02m OD. These silty gravels represent natural deposits possibly of a Pleistocene or Holocene date.

Overlying the gravel, at 2.17m OD, was a 0.15m thick deposit of pale grey silty clay and occasional small gravel [13]. This may represent a historic dryland surface forming in alluvial deposits and evidence of a slight brown colouring to the grey silt may support this. The absence of soil structure and pale colouring could be a result of later water logging and gleying. It could also represent foreshore or slow flowing channel deposits that may relate to a subsidiary channel or channel meander related to the tributary valley known to exist to the east. However, evidence of abundant rootlets and the insect remains within the bulk samples suggests a probable mudflat environment. Previously across the Olympic site gravel deposits of both historic and prehistoric date have been dated at a similar elevation and further investigation is needed.

Sealing this was an alluvial clay deposit [12], 1.20m thick and recorded at a height of 3.34m OD. This represents probable seasonal flooding deposits associated with rising river levels probably linked to RSL rise and increased run off as a result of human activity within the catchment. The blue grey colouring indicates poor drainage and anaerobic conditions (gleying) as river level rises. The absence of any visible weathering of the alluvial deposits and the abundant mollusc remains in the environmental samples suggests that it was almost constantly inundated or that later periods of drying out have been truncated or subject to some form of post-depositional alteration, such as gleying. No archaeological deposits were present within or beneath these alluvial deposits.



Overlying the alluvial sequence was a sequence of 19th -20th century industrial and commercial dumping. The first deposit overlying clay was a 1.80m thick mixed layer of silt, clay and industrial waste [11] recorded at a height of 5.05m OD. The second deposit consisted of a similar 19th-10th century, 2.50m thick mixed dump of silt, clay and industrial waste [10], recorded at a height of 7.60m OD.

Overlying this was a 20th/21st-century levelling layer for a concrete slab, recorded with a surface height of *c* 7.68m OD.

### **3.3 Stratigraphic interpretation of the site**

#### ***3.3.1 Phase 1: Pleistocene deposits***

The gravels recorded in the trenches with a surface of *c* 2m OD may be of Pleistocene date. However, access restrictions to this depth meant detailed observation was not possible to ascertain their date or the environment in which they were deposited.

#### ***3.3.2 Phase 2: Foreshore/mudflat deposits***

The silty clay with occasional gravels at around 2.17 m OD to the north of the site most likely represents foreshore deposits or near channel mudflats with the slight potential of a slow flowing, but active, broad channel. It could also be a result of dry land formation in alluvial deposits that may have subsequently been waterlogged and gleyed.

#### ***3.3.3 Phase 3: Alluvium***

The alluvial clay recorded at around 3m OD across the site may represent seasonal overbank flooding of near channel mudflats. There is little evidence for stabilisation or the formation of a dryland surface in this deposit.

#### ***3.3.4 Phase 4: 19th–20th century activity***

Trench PDZ4.10 contained evidence for 19th-century soil formation at the top of the alluvium. Both trenches have provided evidence for the area being used for the dumping of both industrial and commercial waste through the 19th and 20th centuries. This dumping has resulted in the build up of up to 4.30m of mixed, contaminated waste covering the area.

### **3.4 Evaluation of environmental evidence**

#### ***3.4.1 Introduction***

MoLAS-PCA geoarchaeologists examined, recorded and sampled the natural sequence exposed within the evaluation trenches. 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 was taken through the natural deposit sequence, at the eastern end of Trench PDZ4.21 and a another monolith was taken through the organic deposits in Trench PDZ4.10. These tins provide an undisturbed column of sediment, as revealed in the trench sections, 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 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 clay (contexts [1], [12] and [13]) in particular. Microfossil examination 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 pollen and diatoms will be examined to determine their potential for past environment reconstruction (see below). 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**

### **3.4.4 Bulk sample processing**

Three environmental bulk soil samples were collected from Site OL-06607, 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.

Sample {2} came from PDZ:4.10 and samples {12} and {13} from PDZ:4.30. 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. A summary of the results is given in Table 3. 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.

Although no artefacts suitable for spot dating were recovered from the alluvial sequence, the deposits excavated contained plant remains, from which radiocarbon dates might be obtained. Specifically the abundant plant remains found in sample {13}. Although not all sequences had samples specifically for radiocarbon dating, the sequence of bulk samples (and the monoliths if necessary) 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 were very abundant in the flots from sample {12}, and rare in {13}. None were seen in sample {2}.

#### **3.4.7 Plant remains**

Charred plant remains were limited to very occasional small flecks/fragments of charcoal seen in all three samples. Waterlogged rootlets were very abundant in sample {13}, where they made up most of the flot, but relatively rare in samples {2} and {12} which contained virtually no waterlogged plant remains. A reasonably large and diverse assemblage of waterlogged seeds was present in sample {13}, consisting mostly of aquatic and/or wetland species such as sedges (*Carex* spp.), spike-rush (*Eleocharis palustris/uniglumis*), water crowfoots (*Ranunculus* subgen. *Batrachium*) and water plantain (*Alisma* sp.).

#### **3.4.8 Insect remains**

Moderate fragments of beetle (Coleopteran) exoskeleton and occasional mites were seen in sample {13}, and all three samples included occasional to moderate water flea eggs (Cladoceran ephippia). Shells of freshwater molluscs were very abundant in sample {12} and rare in {13}.

sample	context	volume (litres)	retained on-site	processed	flot vol (ml)	chd wood	wlg seeds/fruit	wlg misc	insect s	molluscs	potential
2	1	20	15	5	1	+		+			virtually no flot
12	12	20	15	5	30	+		+		+++	v. many fw molluscs
13	13	20	15	5	10	+	+++	+++	++	+	wetland seeds, mod insects

Table 3 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 trenches 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. These dumped deposits potentially truncate and overlie a series of alluvial clay, and sandy gravel deposits recorded across the site. Observation of the deposit sequence of archaeological interest was hampered by rapid water ingress, owing to its proximity to several rivers, and contamination issues. This meant the lower part of the sequence was only cursorily examined.

Further clarification of the evaluation results, involving work on the samples and dating, in particular, is needed to be confident in the interpretations presented. In order to understand the archaeological significance of the deposits it will also be necessary to place the results in the context of the stratigraphic sequence recorded in nearby trenches and boreholes. However, the stratigraphic sequence and deposit characteristics as discussed above are internally consistent and the results presented in this report are considered to be an accurate record of the deposits existing on the site.

The evaluation has shown no man made features preserved and sealed within the alluvial sequence within PDZ 4. The trenches satisfy the original requirements of the evaluation as stated in the Written Scheme of Investigation (MoLAS-PCA 2007b).

## 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:

*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?*

Although gravels of possible Pleistocene date were observed in all of the trenches, they were not recorded in any detail or sampled, owing to contamination and rapid water ingress. As a result, there is no potential for obtaining information about Late Upper Palaeolithic activity or environment from the trench.

*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 was found on site although potential near channel mudflats or foreshore deposits possible associated with the tributary valley lying to the west or to a later watercourse. These deposits due to their elevation could also be a result of stabilisation and dry land formation that was later waterlogged and as a result of the gleying process lost much of the most apparent evidence of soil formation. Further information about the characteristics of a possible watercourse or dryland surface might be obtained by examination of environmental micro-and macrofossils preserved in the bulk and monolith samples taken from these deposits. In addition scrutiny of historic map evidence in conjunction with deposit modelling during the assessment stage of the project might be able to shed light on the relationship of these deposits with the tributary valley, the historic channel and the development of the River Lea, and Waterworks Reservoir.

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

No evidence for prehistoric occupation was seen during the evaluation. The earliest deposits recorded were a series of dumped deposits dating from the 19th century onwards, overlying the natural alluvial sequence.

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

The earliest deposits surviving on the site date to the 19th century. In Trench PDZ4.10 a thin layer of sandy, clay silt [3], was recorded at a height of 5.30m OD. This deposit may represent either one of many sequences of late Post-Medieval dumping or a 19th century buried soil horizon sealed by 19-20th century commercial and industrial dumping.

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

The two trenches have provided evidence for the area being used for the dumping of both industrial and commercial waste through the 19th and 20th centuries. This dumping has resulted in the build up of up to 4.30m of mixed, contaminated waste covering the area.

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

The two evaluation trenches lie outside of and to the north of the reservoirs footprint. No remains associated with the reservoir structure were present.

## **4.2 General discussion of potential**

The evaluation has shown that although earlier alluvial deposits survive intact beneath late 19th century made ground, no evidence for historic or prehistoric occupation was present in the two evaluation trenches.

This alluvial sequence was only sampled to a limited extent, and not examined in any detail because of rapid water ingress and contamination issues. However, a tentative interpretation of the lowest part of the sequence and a more robust interpretation of its upper part, together with the collection of a sequence of bulk and monolith samples from the deposits above *c* 2m OD was made.

However, interpretations suggest that a former tributary valley did not cross the site. Potential near channel mudflats or foreshore deposits were found that could relate to a tributary valley lying to the west or to a later watercourse. These deposits due to their elevation could also be a result of stabilisation and dry land formation that was later waterlogged and as a result of the gleying process lost much of the most apparent evidence of soil formation.

Further information about the characteristics of a possible watercourse might be obtained by examination of environmental micro-and macrofossils preserved in the bulk and monolith samples taken from these deposits. 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 remains found in the bulk samples would provide evidence to tie the deposits into an archaeological timeframe

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 provided information that contributes 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 the site should clarify the age and environments represented. The geoarchaeological evidence seen across both sites has been able to provide information that will aid in the overall 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 surrounds, and will assist in landscape reconstruction models being developed for the lower Lea, which, *when combined with the data from the other Olympic sites*, will be of regional significance.

## 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 3.2 above will be assessed against these criteria.

### *Criterion 1: period*

Taken as a whole, archaeology of the site is characteristic the 19th and 20th centuries. Although the deposits represented span a wide time span. 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*

Whilst there may be considerable contemporary documentation for the later medieval period from c 1300 on, the truncated and fragmentary nature of archaeological remains from this period will render most of this information unusable/ it is unlikely that any of this will be specific enough to relate to individual features.

### *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 geoarchaeological 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.

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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)

*Criterion 7: diversity*

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 deposits of alluvium overlying early Holocene gravels are likely to exist elsewhere in the vicinity. 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.

## 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, which are of little importance for archaeological finds and features but initial evaluation of the samples collected suggests they have some palaeoenvironmental potential. In particular, both bulk and monolith samples might preserve useful information about the vegetation change and the changing environment of the Olympics Site from a time when environmental evidence is typically poorly preserved. If from an earlier period they will contribute to our understanding of the evolution of the tributary valley that lies to the west, which has previously been recorded but as yet poorly understood.

No further excavation is required to realise the potential of these deposits. 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;
- The flots already processed are assessed for plant remains;
- One radiocarbon date is obtained by AMS on identified plant material, from sample {13}, 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 authors would like to thank Elaine Eastbury, Angela McCall, Scarlett Rose McGrail, Tristram Adfield, Georgina Pascoe, Anthony Morrin, Gideon Simmons, Margaret Feryok, Phil Frickers and Jem Rogers for their on-site assistance, Gary Brown for his project management, and to 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 contractor's ground works and engineering teams for their cooperation and assistance during the project.

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ODA, 2007b Olympic, Paralympic and Legacy Transformation Planning Applications  
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: molas1-40703

### Project details

Project name	Olympic Development, Planning Delivery Zone 4, Work Package 2.
Short description of the project	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 the Work Package 2 site 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 trenches were excavated to the level of the natural gravels. These deposits were overlain by an alluvial sequence (ranging from 0.90-1.35m in thickness) with suggestions that much of the area was waterlogged marsh environment or subject to flooding over time. The alluvial deposits were then sealed by 19th-20th century made ground or landfill deposits, above which was either concrete or laid topsoil.
Project dates	Start: 24-09-2007 End: 23-11-2007
Previous/future work	No / Not known
Any associated project reference codes	OL-06607 - Sitecode
Type of project	Field evaluation
Site status	Local Authority Designated Archaeological Area
Current Land use	Industry and Commerce 1 - Industrial
Methods & techniques	'Targeted Trenches','Environmental Sampling'
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 Planning Delivery Zone 4, Work Package 2.



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  
 Height OD Min: 2.00m Max: 2.00m

### 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  
 Project supervisor Elaine Eastbury  
 Type of ODA  
 sponsor/funding body

### Project archives

Physical Archive recipient LAARC  
 Physical Archive ID OL-06607  
 Physical Contents 'Metal','Ceramics','Environmental'  
 Digital Archive recipient LAARC  
 Digital Archive ID OL-06607  
 Digital Contents 'Ceramics','Environmental','Metal'  
 Digital Media available 'Images raster / digital photography','Survey'  
 Paper Archive recipient LAARC  
 Paper Archive ID OL-06607  
 Paper Contents 'Ceramics','Environmental','Metal'  
 Paper Media available 'Context sheet','Plan','Report','Section'

### Project bibliography 1

Grey literature (unpublished document/manuscript)

Publication type

Title Planning Delivery Zone 4, Work Package 4.

Author(s)/Editor(s) 'Thrale, P'

Date 2008

Issuer or publisher MoLAS

Place of issue or MoLAS  
publication

Entered by Paul Thrale (molas.archive@museumoflondon.org.uk)

Entered on 16 April 2008

## 10 Appendix 2: 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 i.e.: 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.

### 11 Appendix 3: Context index

Context No.	Trench	Plan	Section/ Elevation	Type	Description	Date
1	PDZ4.10		1,2	Layer	Alluvial clay	12/10/07
2	PDZ4.10		1,2	Deposit	Natural sandy gravel	12/10/07
3	PDZ4.10		1,2	Deposit	Silt	12/10/07
4	PDZ4.10		1,2	Deposit	Re-deposited clay	12/10/07
5	PDZ4.10		1,2	Deposit	Re-deposited silty, clay	12/10/07
6	PDZ4.10		1,2	Deposit	Re-deposited clay	12/10/07
7					Not used	
8					Not used	
9					Not used	
10	PDZ4.30		1	Layer	c19-20th Industrial waste	21/11/07
11	PDZ4.30		1	Layer	c19-20th Industrial waste	21/11/07
12	PDZ4.30		1,2	Layer	Alluvial clay	21/11/07
13	PDZ4.30		1,2	Layer	Silty clay and gravel	21/11/07
14	PDZ4.30		1,2	Layer	Silty gravel	21/11/07
15					Not used	
16					Not used	
17					Not used	
18					Not used	
19					Not used	
20					Not used	

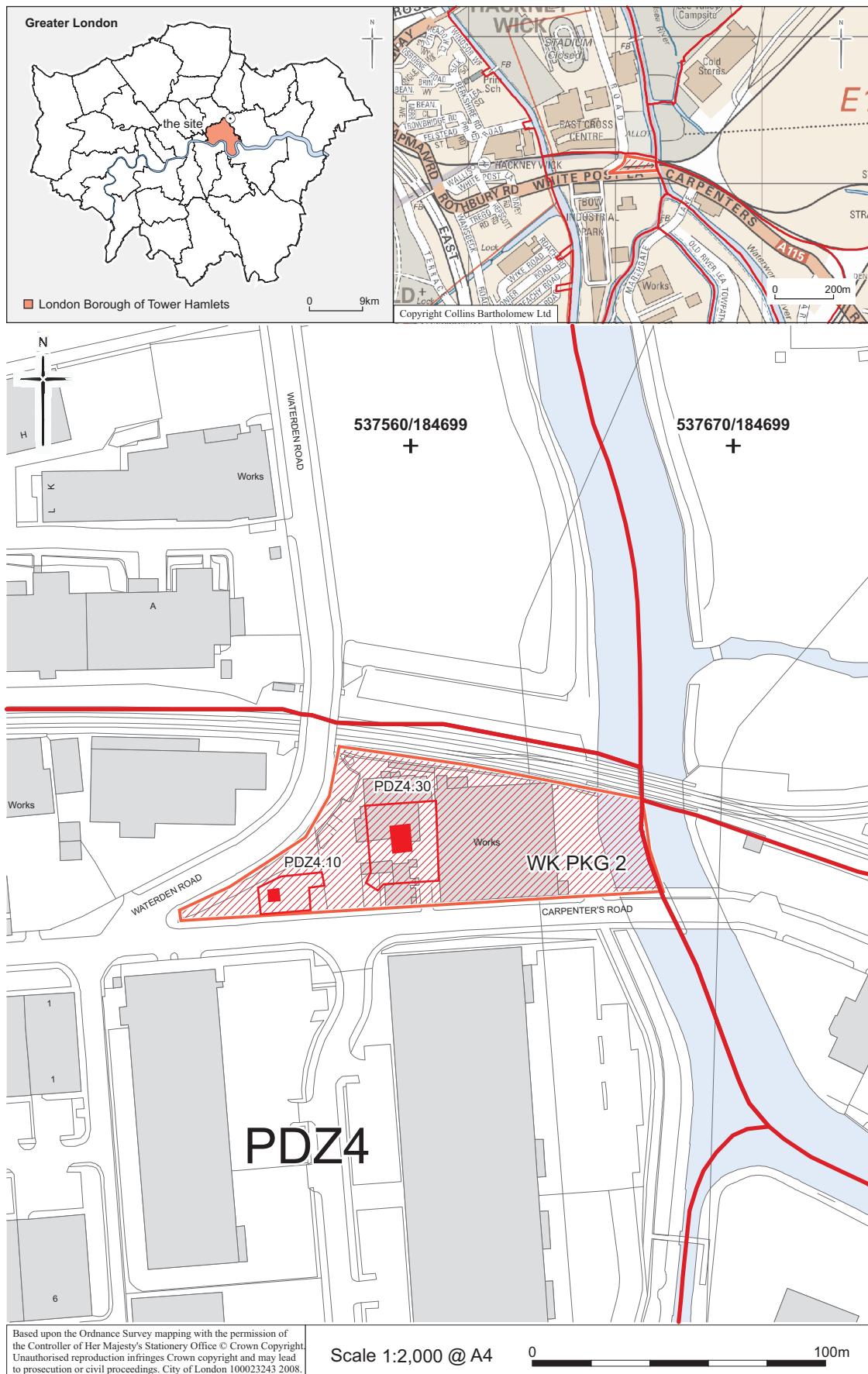


Fig 1 Location map

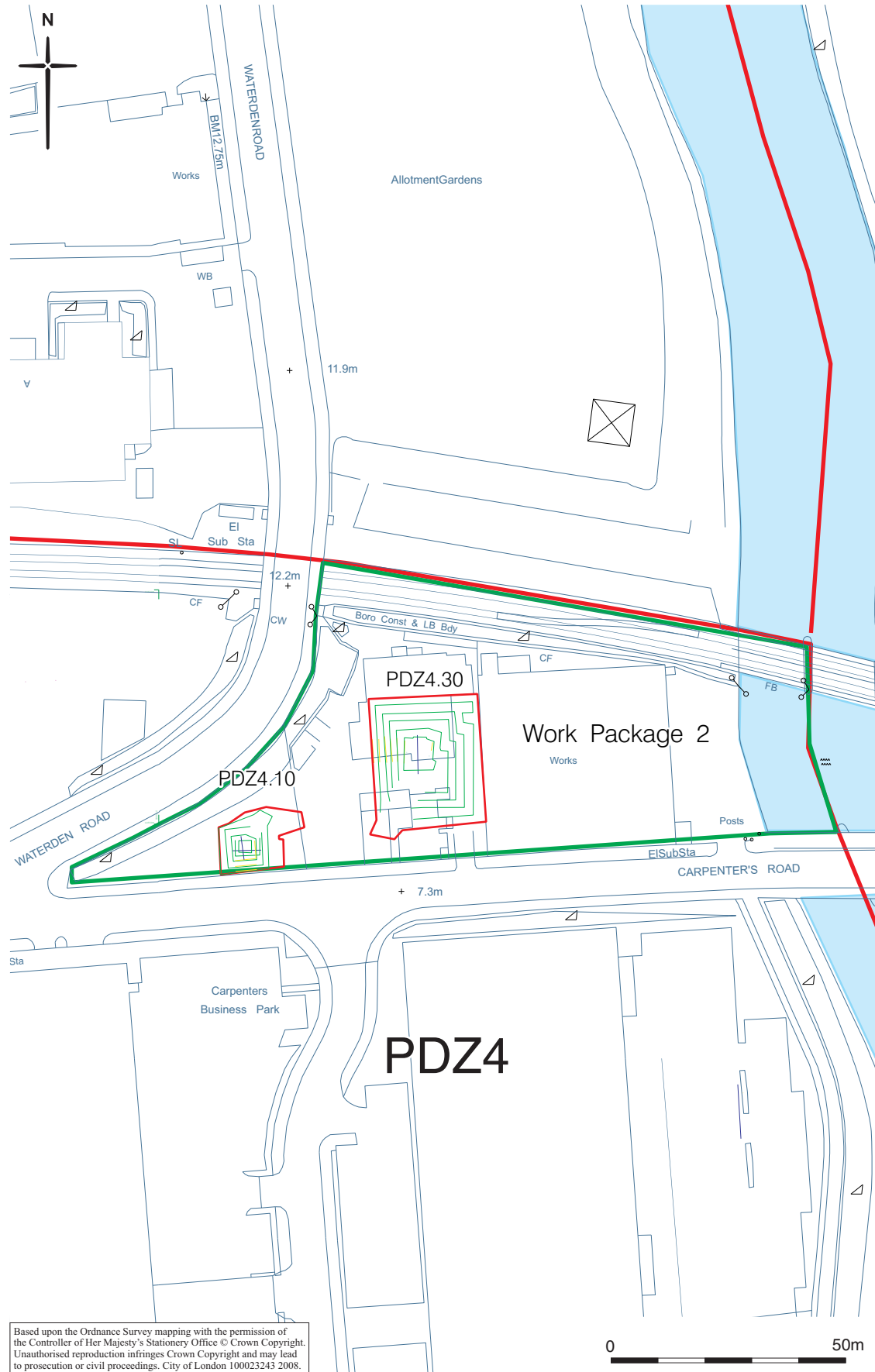


Fig 2 Trench locations



Fig 3 Plan of Trench PDZ4.10

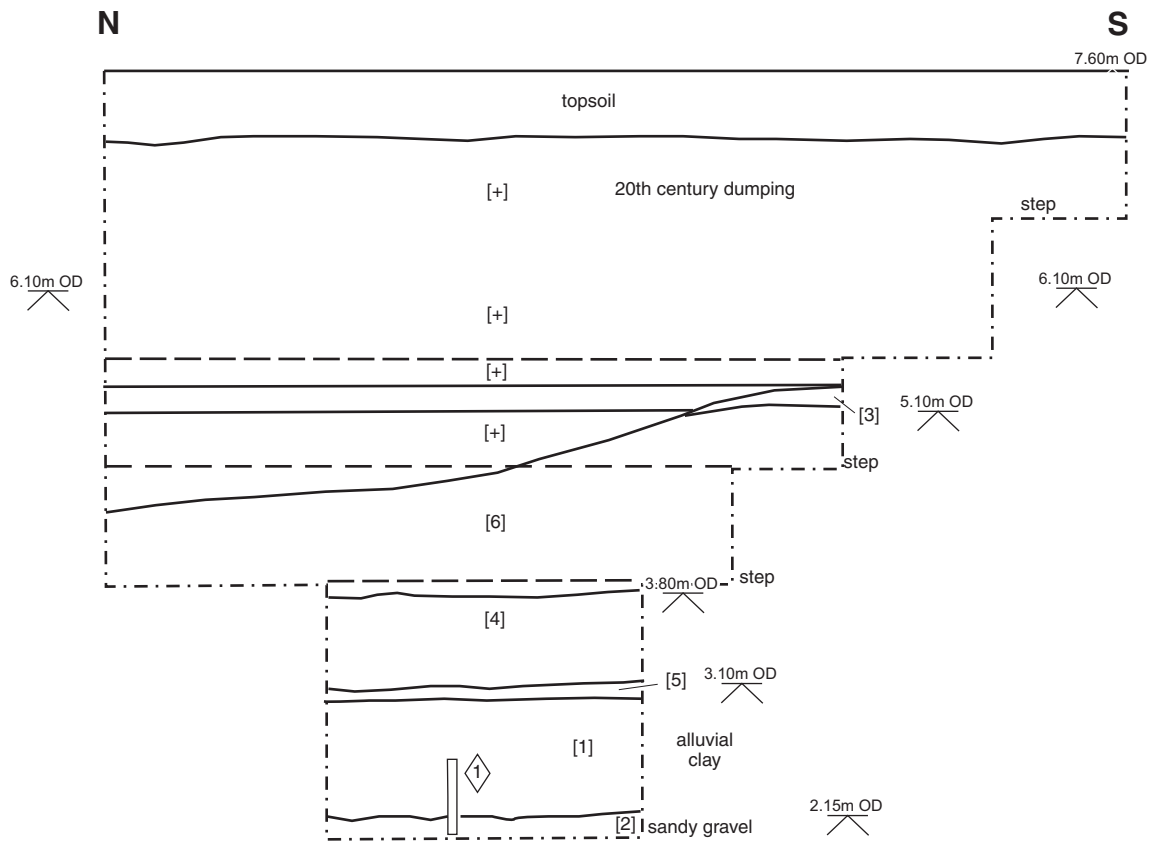


Fig 4 West facing section 2 of Trench PDZ4.10



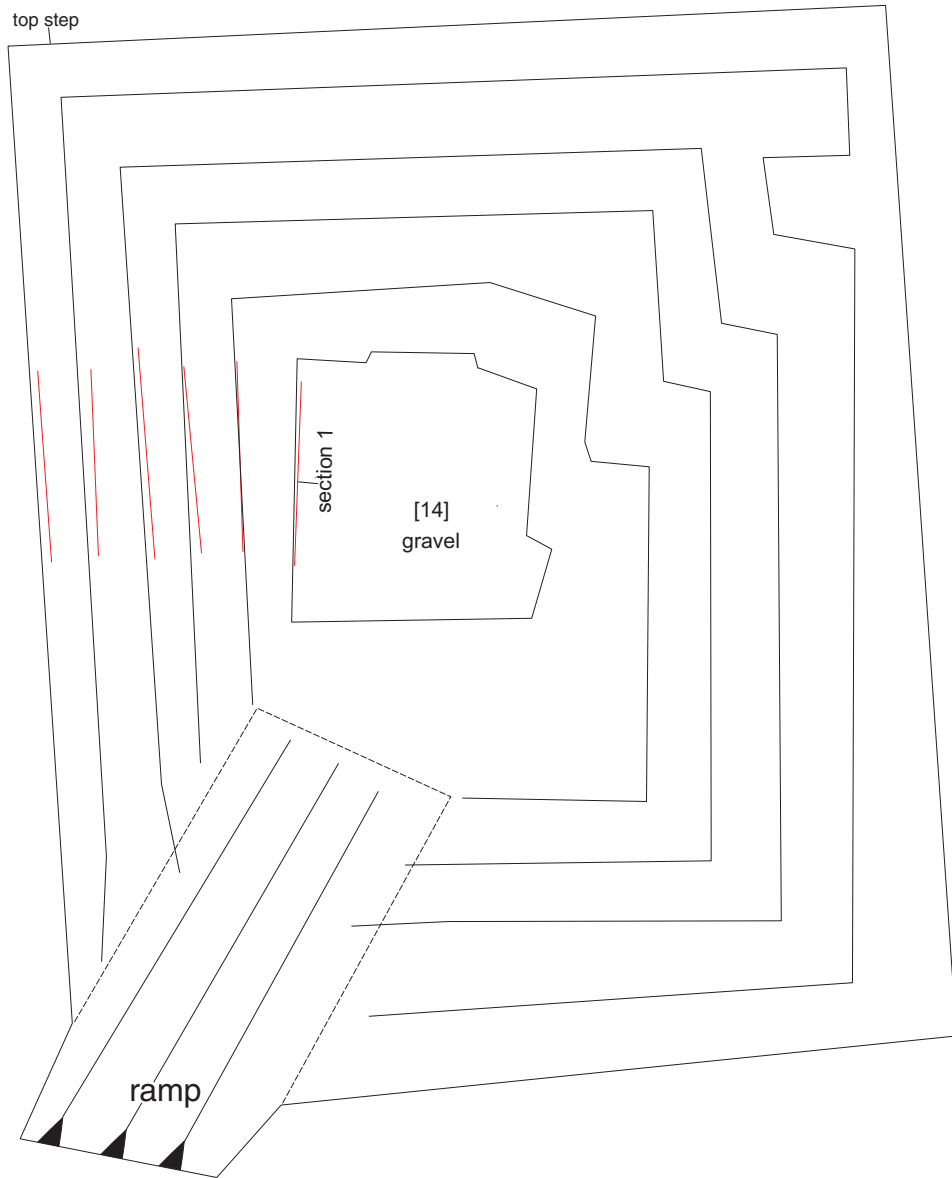


Fig 5 Plan of Trench PDZ4.30

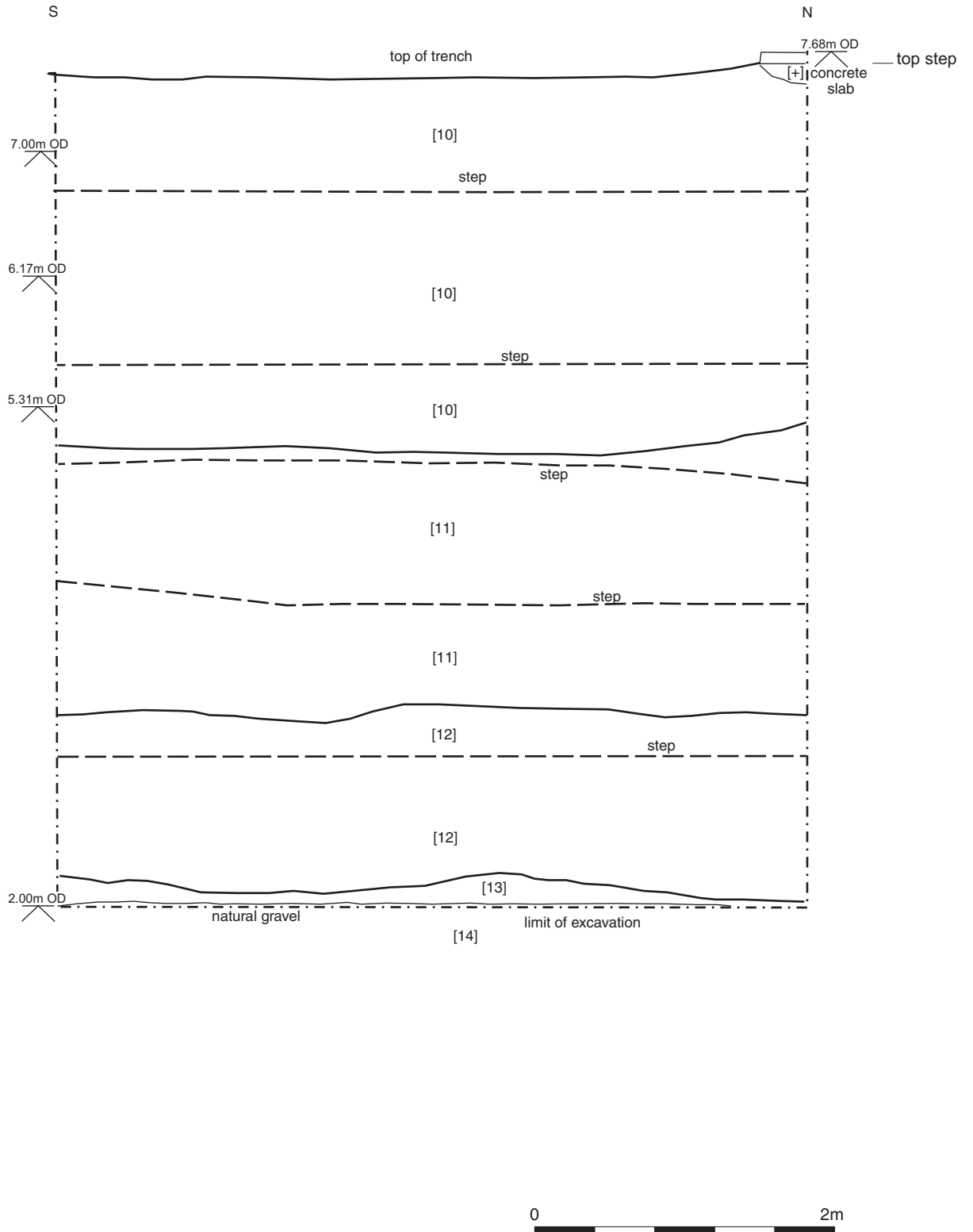


Fig 6 East facing Section1 of Trench PDZ4.30