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Trench PDZ3.35/36

E15

London borough of Newham

A post-excavation assessment
Site Code OL-04307
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Executive summary

This report presents the results of excavation work undertaken within Trench PDZ3.35/36 within the Olympic park. The work was undertaken by the Museum of London Archaeology Service and Pre-Construct Archaeology (MoLAS-PCA) within the area of the Olympic, Paralympic and Legacy Transformations Planning Applications: Planning Delivery Zone 3, London Borough of Newham, London E15. The report was commissioned from MoLAS-PCA by the Olympic Delivery Authority (ODA).

As a result of evaluation this it was determined that the archaeological sequence revealed within Trench PDZ3.35/36 was of sufficient significance to require further investigation. The result of the mitigation work has helped to refine the initial findings and so assist in our better understanding the archaeological potential of the area.

The earliest phase recognized was a gravel, forming part of the Early Holocene/prehsitoric floodplain. This gravel was overlain by a Late Bronze Age land surface. Subsequent river encroachment indicates a period of increasingly wetter conditions which resulted in the deposition of both high and low energy fluvial/alluvial sediments. Following this period of river advance at least a period Roman activity was recognized: comprising the cutting of a substantial ditch and the construction of a timber structure, probably a retting pit. Subsequent environmental change resulted in the migration of a river channel across the site, from the mid-late Roman period to the late Roman–mid Saxon periods. Fluvial river deposits as well as overbank flood deposits characterised this active channel phase and a gradual sequence of higher energy deposition through to low energy silting and final abandonment was revealed. Sealing these deposits were the remains of a post-medieval soil horizons and successive modern layers of levelling and ground level raising deposits.

Human activity was substantiated by the pollen and plant macrofossil assessments, indicating agricultural activity locally throughout the period of sedimentary deposition across the site.

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1 Introduction

1.1 Site location

The excavation took place to the west of Marshgate Lane and north of the Northern Outfall Sewer in the northern, central area of Planning Delivery Zone 3 (PDZ3) of the Olympic, Paralympic and Legacy Transformations Planning Applications, in the London Borough of Newham, designated as work package 2 within PDZ3, hereafter called 'the site' (Fig 1).

The zone as a whole occupies a roughly trapezoid area of land, bounded to the north by the River Lea, to the east by the Pudding Mill River and to the south by the Northern Outfall Sewer. The River Lea is also the boundary between the London Boroughs of Newham and Tower Hamlets.

Trench PDZ3.35/36 was located close to the south bank of the River Lea, to the west by the Pudding Mill River (Fig 2). The OS National Grid Reference for the centre of the excavation area is 537463 183957.

1.2 The scope of the project

This report was commissioned by the Olympic Delivery Authority (ODA) and produced by the Museum of London Archaeology Service and Pre-Construct Archaeology (MoLAS-PCA). The report has been prepared within the terms of the relevant Standard specified by the Institute of Field Archaeologists (IFA 2001). The project covers the excavations carried out at Trench PDZ3.35/36 in the Olympic Park, which shall hereafter be referred to as 'the site'.

This post-excavation assessment describes the results of archaeological excavation, undertaken by MoLAS-PCA. This report assesses the data recovered from the excavation and thus measures the archaeological potential of the site.

The aim of the project is to assess the archaeological significance of any findings made during the above works and understand them in their wider context, whether local, regional, national or international. The proposed analysis and publication project will address those issues raised in the project research aims whilst integrating local archaeological knowledge from other excavations in the immediate and surrounding area. This post-excavation assessment report incorporates specialist reports on insects, animal bone, lithics, diatoms, Romano-British pottery, small finds, plant macrofossils, timber, ceramic building material, mollusc remains, pollen, prehistoric pottery and ostracods. The environmental and geoarchaeological aspects of these inputs are incorporated into a specific section of this report (section 5.10).

Reference should be made to the preceding desk-based assessment undertaken for the whole of PDZ3 (MoLAS-PCA 2007a) and *Evaluation Report* (MoLAS-PCA 2008).

The excavation was carried out in accordance with a *Written Scheme of Investigation for Archaeological Excavation* (MoLAS-PCA 2007b).

1.3 Circumstances and dates of fieldwork

The legislative and planning framework in which the archaeological exercise took place was summarised in the *Written Scheme of Investigation for Archaeological Excavation* which formed the project design for the excavation (MoLAS-PCA 2007b).

In accordance with local and national policies an archaeological evaluation was required in advance of the redevelopment as part of the planning process. Eight evaluation trenches (PDZ3, Work Package 2), all oriented north-west to south-east, had been excavated across the conjectured line of the Roman road that connects the city of Londinium (London) with the early military base and colony at Camulodunum (Colchester). Due to space limitations trenches PDZ3.35 and 3.36 were amalgamated into a single trench, renumbered PDZ3.35/36. The PDZ3, Work Package 2 evaluation took place overall between 17 August 2007 and 26 October 2007.

Of the eight evaluation trenches excavated, only PDZ3.35/36 required further mitigation work to enhance understanding of the archaeological resource revealed. Archaeological excavation on Trench PDZ3.35/36 was undertaken between 10 and 28 September 2007 by a joint MoLAS-PCA team of up to seven archaeologists. Excavation followed directly from evaluation with no break, with EH approval. This was due to time constraints in programming the work: a limited window was available for accessing the area proposed for the main Olympic Stadium.

The archive comprises: 1 electronically surveyed overall trench plan, one drawn detailed trench plan at a scale of 1:20 and 5 single context plans also at a scale of 1:20. 111 context records were allocated and 5 sections at a scale of 1:10 were drawn (Fig. 6). In addition, 12 bulk, 4 monolith and 2 radiocarbon samples were taken. The site finds and records have been allocated the site code OL-04307.

Large volumes of both perched and ground water within the depositional sequence made the excavation difficult. Excavation was undertaken to the top of the alluvium, before machining a test slot to the natural gravels in order to ascertain the extent of any hydraulic pressure in the groundwater. The management of this water was achieved by the retention of two cross baulks (seen on Fig 2) and the continuous pumping of water from hand-excavated collection sumps. On site discussions were held between MoLAS-PCA, Capita Symonds, English Heritage, Atkins and the Edmund Nuttall site engineers to determine the depth and extent of the excavations that could be safely undertaken.

1.4 Organisation of the report

The *Post-excavation assessment* is intended to sum up what is already known and what further work will be required to reach the goal of a well-argued presentation of the results of recording and analysis.

The principles underlying the concept of post-excavation assessment and updated project design were established by English Heritage in the *Management of Archaeological Projects 2* (MAP2), (1991).

This document details the work undertaken on the analysis of the site sequence (section 4), for the assessment of the archive (section 5). It compares observations with the original research aims (section 6.1) and discusses the site's wider significance (section 7)

As part of the *Post-excavation assessment*, the analysis has resulted, in terms of the report, in elements of the excavation being referred by sub-group (eg SG01) or context (eg [100]). Each is an unique numerical reference, within its type, which relates to a specific element of the excavation. A subgroup is amalgamation of contexts, representing a related group of contexts.

The separation of the lower parts of the excavation area by baulks required allocation of separate context numbers within each sondage, between each baulk (the baulks and three sondages are seen on Fig 2). These contexts, where possible, in this report are discussed as single entities; if relationships are ambiguous each deposit is accounted separately but cross-referenced in discussion.

2 Historical and archaeological background

The following summary of the geological and archaeological background to the site is based upon the desk-based assessment for PDZ3 (MoLAS-PCA 2007a) and draws upon the results of the evaluation undertaken at Trench PDZ3.35/6 (MoLAS-PCA 2008).

2.1 Topography

The site is located on the western side of the floodplain (valley bottom) of the Lea Valley, to the east of the River Lea and to the west of the City Mill river, east of Trench PDZ3.35/36.

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 it's archaeological potential.

Late Pleistocene river gravel represents the earliest naturally derived deposit in Trench PDZ3.35/36, with a surface level of between 1.84 and 1.70m OD, recorded in the evaluation. The higher ground of the gravel terrace, which forms the western side of the valley, lies a short distance west of the site, on the opposite side of the River Lea.

Tertiary bedrock, which in this area is variably London Clay and Woolwich and Reading Beds, underlies the gravels. The surface of bedrock delineates the extent of archaeological deposits.

Overlying the gravels is a sequence of naturally derived alluvial sediments, which culminated in a buried topsoil of post medieval date. These alluvial deposits would have supported a range of different environments from wetland through to dry land, which are likely to have existed within the Lea Valley from the Mesolithic period onwards. These environments would have been constantly changing throughout the Holocene period.

The landscape of the site in the past bears little relation to the visible landscape of today, with the deposition of made ground deposits completely obscuring the earlier topography. The OD levels for the ground surface prior to the fieldwork was between 8.44m to 7.71m OD. This post-medieval industrial topography has now been reduced as a part of the present development.

2.2 Prehistoric

Although no prehistoric find or deposits have previously (before the current MoLAS-PCA fieldwork on the Olympic site) been recorded within PDZ3 itself, antiquarian findspots show a low level of activity in the form of disassociated finds.

However, recent archaeological fieldwork in the immediate vicinity MoLAS-PCA increasingly indicates that the area was occupied and exploited. Neolithic land surfaces and Bronze Age worked wood have been identified in the north of PDZ1, to the east of the site (site OL-00105). Site OL-00305 in the south of PDZ1 revealed evidence for an area of slightly higher and therefore drier land which had Bronze Age – Iron Age features, such as post-holes, pits, a ditch and a possible ring gully, cutting through it. A small amount of struck and reworked flint and a large amount of burnt flint was also recovered from the site.

More specifically, the evaluation on Trench PDZ3.35/36 uncovered a buried soil/prehsitoric land surface that included Late Bronze Age–MIA pottery, indicating some form of activity in this area.

Wooden structures such as trackways and jetties may be present within PDZ3. A fragment of possible Iron Age trackway, the precursor to the later Roman road, was recorded in the centre of PDZ3 (GLSMR 080875). Watery areas were often a focus for ritual activity, such as the deposition of votive objects, and it is possible that the Neolithic and Bronze Age axes recovered from the neighbouring PDZ2 are examples (GLSMR 061746, 060258).

2.3 Roman

The Roman road that connected the main port at *Londinium* (London) with the early military base and colony at *Camulodunum* (Colchester) is projected across PDZ3. There is also a moderate potential for evidence of the Roman crossing point across the Lea. This may have taken the form of a ford or via timber bridges or raised platforms, crossing the braided channels from island to island.

Associated with this road is fragmentary evidence for settlement activity in the near vicinity; either a nucleated settlement or several small farms or farmsteads dotting the landscape with associated field systems. A cemetery or cemeteries are also possible this area. Roman occupation within PDZ3, if present, is likely to be sited on the islands of higher ground.

No *in situ* Roman evidence was found during the evaluation on Trench PDZ3.35/36. However, see below for redeposited Roman finds.

2.4 Saxon

Evidence of Saxon activity in the area is limited to the River Lea and its channels (the Stratford Back Rivers). The river will have remained a useful resource and by the late Saxon period mills may have been located along the river. There is a moderate possibility that *in situ* remains associated with management of the streams and banks of this period survive within alluvial deposits.

No Saxon evidence was found during the evaluation on Trench PDZ3.35/36.

2.5 Medieval

Although no archaeological evidence for medieval activity comes from within PDZ3, areas to the immediate west were occupied and exploited from at least the 13th

century. The rivers within PDZ3 have a moderate potential for medieval deposits and features relating to the mill complexes known to have existed in the area. These features may include timber wharfing and leats set back from the waterfront themselves.

The evaluation on Trench PDZ3.35/36 recorded a ditch cut, the fill of which contained Roman and Medieval pottery fragments, and a heavily abraded 1st century Roman coin. This ditch had been cut into sand/gravel horizons that were deposited during the encroachment of a river across the former dry land surface. These may have initially been the result of a large-scale flooding episode. An undated timber structure had also been cut into these sand/gravel horizons. Further undated alluvial deposition and a subsequent river channel post-dated these features in the evaluation.

2.6 Post-medieval

During the 16th and 17th century the land in PDZ3 was, as earlier, characterised by marshes and remained undeveloped. Evidence of past land management and exploitation may survive in former stream channels. There is a possibility of evidence of post-medieval activity, particularly due to the proximity of the River Lea and the Pudding Mill River. There is potential for isolated structures relating to stream channels.

Later, the area still remained largely open ground, with little development. The marsh no doubt hindered development but also attracted noxious industries, such as the 19th-century tar and turpentine distillery between the Pudding Mill and City Mill rivers. Other evidence is expected to relate to quarrying and subsequent ground consolidation. The archaeological deposits are likely to be sealed by a considerable thickness of Victorian and modern made ground. In some places the made ground may infill areas of historic excavation, such as gravel quarries, brick pits and diverted river channels.

The evaluation on Trench PDZ3.35/36 found pre-modern topsoils and modern made ground.

3 Original research aims

The following research aims and objectives for the excavation were established in the *Written Scheme of Investigation For An Archaeological Excavation at Trench PDZ3.35* (MoLAS-PCA 2007b) and are intended to address the research priorities established in the Museum of London's *A research framework for London Archaeology* (2002) and those of the evaluation (MoLAS-PCA 2008):

- To identify evidence for settlement of prehistoric and historic date, particularly within zones of higher ground not already truncated by quarrying.
- To identify wetland and channel margin activity of prehistoric date and riverside structures of historic date.
- To identify evidence for the nature and/or date of past land management and exploitation.
- To identify evidence for the nature and/or date of past waterways management and exploitation.

4 Site sequence: statement on field work

4.1 Introduction

The excavation refined the understanding of the depositional sequence uncovered in the evaluation, and subsequent analysis allowed meaningful interpretations to be made.

The sequence was divided in eight periods (Periods 1–8), discussed below.

Periods 1-6 were dominated by alluvial deposition or riverine activity, with evidence for a cultural presence and landscape activity in Period 2–6. Significantly, the cultural activity in Period 4 had left distinct remains recorded in the excavation and was dated to the Roman period. Periods 7 and 8 were modern/pre-modern.

4.2 Period 1: Floodplain gravels

Period 1 was not illustrated on plan as it was a uniformly extended across the excavation area, but see Fig 6.

SG01 represented the earliest contexts [173], [174] and [210]. They consisted of a loose mid grey poorly sorted sandy gravel: [173] and [210] were revealed within the southern and central sondages, whilst deposit [174] was more fully exposed in the northern most sondage.

All three SG01 contexts are believed to represent essentially the same deposit: high-energy fluvial deposition, possibly Late Pleistocene river gravels. The surface of the deposit was between 1.84 to 1.70m OD, and it was not excavated. Its elevation suggests it formed part of the Early Holocene/prehsitoric floodplain.

4.3 Period 2: Buried soil/prehistoric land surfaces

Period 2 was not illustrated on plan as it was a uniformly extended across the excavation area, but see Fig 6.

Contexts [215/217] (SG02) within the central trench and context [262] (SG03) in the southern most trench and consisted of soft dark brownish grey clay/sand that contained around 30% angular and sub-angular pebbles. These contexts clearly represent the same depositional event and are discussed as one below.

The surface level of the SG02 deposit ranged between 1.80m to 1.95m OD, and it had a maximum thickness of 0.22m. Its formation process was clearly natural, probably alluviation followed by subsequent bioturbation as suggested by the pebble inclusions. This bioturbation is a key part of the process, which would have mixed the alluvial clay with the underlying gravels and also incorporated material deposited on the ground surface.

Diatoms in [215] indicate the presence of shallow freshwater during deposition. However [215] also included ostracods (*Cypria ophtalmica)* which prefer still, even stagnant water. Other ostracods present (charophytes) live in pure, clear water. [215] had accumulated over time, in variable conditions. AMS radiocarbon dates for [215] were 410 to 360BC and 280 to 260BC. Contexts [215/217] included fragments of burnt flint and Late Bronze Age pottery. Charred cereal grains in [217] were intrusive.

Diatoms confirmed a freshwater depositional environment for [262], although ostracods recovered indicated periodic weathering and waterlogging possibly as pools across the surface of [262].

Overlying the SG02/SG03 surface were [172] (SG04) and [197] (SG05), which were revealed within the southern and central sondages and are thought to represent the equivalent deposit. This consisted of a firm, mid brownish grey silty clay with gravel and sand. Layer [197] was revealed within the southernmost trench, whilst deposit [172] was partly exposed within the central sondage. The surface of these layers was between 1.65m to 2.08m OD and the maximum thickness of the deposit was 0.22m.

A single sherd of abraded Late Bronze Age-MIA pottery was recovered at the interface between context [262] (SG03) and deposit [197].

Layer [197] contained fragments of charcoal indicating burning (possibly anthropogenically induced) at the time of deposition. The pollen record from [197] indicates an open environment on a freshwater river floodplain.

The formation process of SG04/SG05, is again natural and is probably similar to that of the underlying SG02/SG03 layers, alluviation followed by bioturbation.

4.4 Period 3: River encroachment

Period 3 saw riverine encroachment and related deposition across the Period 2 surfaces. See Fig 3 and Fig 6.

The Period 2 surfaces were overlain by contexts [169] (SG06) and [198] (SG07), revealed within the southern and central sondages. These clearly represented the same deposit, a loose sand that varied in composition from coarse to granular, with the grain fining downwards. The colour varied from light brownish yellow in the central sondage [169] through to dark blackish grey in the southern one [198]. The surface level was between 1.96m to 2.28m OD and the layer had a maximum thickness of 0.22m. The combined extent (including extrapolation through baulk) measured was 21.90m NW-SE x 2.54m NE-SW.

The formation process was natural and probably represents a fairly high-energy depositional event that is likely to have resulted from the encroachment of the river over the former dry land-surface: i.e. a riverine sand deposit. This may have initially been the result of a large-scale flooding episode.

Twigs, seeds, beetle remains, weevil, water flea, earthworm egg capsules, mites and a parasitic wasp were recovered from [198], suggesting an input of material from an aquatic environment into the deposit. The high energy depositional environment allowed the entrainment and transportation of coarser grained sediments and remains. The water fleas indicated a clear aquatic environment but the weevil species could

give the first indication of possible agricultural practices locally as it is associated with herbivore dung and/or rotting vegetables.

The surface of the SG06/SG07 deposit presented a channel-like scour that was probably the result of fluvial action. Context [265] was located at the north end of the southern trench and context [264] was located at the south end of the central trench. They were recorded as non-anthropogenic cuts or truncation events, and combined form a roughly N-S orientated irregular depression in the surface of context [198] (SG08). Both the southern and northern extent of this depression lay beyond the limits of the excavation. Overall, it measured *c* 11.80m in length by 1.80m in width by 0.40m depth, with convex and moderately shallow sides and an uneven base.

Such depressions (or swales) exist between the sandy ridges of point and channel bars. The swale would have formed a wet hollow within the newly formed sand bar. Its fill consisted of a soft dark brownish grey humic clayey silt [168/266] (SG09) (two separate numbers were allocated due to the intervening baulk) containing occasional sub-angular pebbles, this is likely to have formed through gradual low energy depositional processes, probably alluvial. No datable material was recovered for SG09.

4.5 Period 4: Historic activity

The Period 3 riverine deposits were cut into by two anthropogenic features of probable historic date, discussed below.

The Period 4 activities took place in a more stable land surface environment than previously present.

See Fig 4 and Fig 6.

4.5.1 Ditch and fills (Roman)

Ditch cut [213] (SG10) was aligned NE-SW and was revealed in plan in the central trench sondage, cutting into deposit [169] (SG06). The cut as seen within the trench measured 3.60m NE-SW x 1.36m NW-SE x 0.48m deep and was 1.66m OD at its base. The sides were straight and moderately sloping, whilst the base was flat.

The ditch contained six fills [201-205] and [214] (SG11). All of these were formed through natural erosional processes. The fills contained horse bones, a cow horn core, Romano-British pottery, Roman ceramic building material and a heavily abraded coin of 1st century Roman date that may have been lost at a later date (possibly as late as the 3rd century)

4.5.2 ?Retting pit

Structure [159] was located at the southern end of the trench and comprised two cuts and 39 individual timber numbers. The structure had been heavily disturbed in antiquity and its original function difficult to determine.

Of the 39 individual timber numbers allocated to the preserved wood that formed the structure, the majority (33 pieces) consisted of un-worked roundwood fragments, which judging by the consistent diameter of each piece are likely to represent coppiced material. The other six pieces of timber appeared to be *in situ*. These are

summarised below. See cover for photograph, looking north-west, at disarticulated wood in the base of the pit.

4.5.2.1 Cut

The structure was set in and delimited by cut [239] (SG12), made into the Period 3 deposit [198]. The cut's south-western extent lay beyond the limits of excavation and as seen it measured 1.60m NW-SE x 3.20m NE-SW x 0.20m deep. In plan it was irregular with shallow sloping sides and an uneven base, the lowest level of which was at 1.88m OD. Within this cut were the remains of a deliberately formed timber structure [159], further discussed below (Fig. 6). The cut itself is believed to have been non-anthropogenic, possibly caused by water erosion.

Cut [242] (SG12) was located approximately 0.20m to the south of [239] and is likely to represent a further element of [239].

4.5.2.2 In situ elements

Two pointed stakes ([175] and [177], (SG13)) were driven into the underlying surface, and were presumably still *in situ.*

Otherwise, of the roundwood fragments only four pieces; contexts [176], [178], [181] and [182] (SG13) appeared to form the remains of an *in situ* fragment of wattling, although this was by no means certain.

- Timber post [175], measuring 450mm (length) x 40mm x 60mm, was set vertically within the north-east part of the cut. Its driven end (tip) was sharpened into a point. The post top survived to 2.08m OD.
- Timber [176] was located approximately 0.20m to the south-west of [175]. This was lying north-south, horizontally on the base of the cut. It measured 200mm (length) x 40mm x 60mm. It appeared to be a quartered timber, but was otherwise unworked. Its highest level was 1.93m OD.
- Small roundwood stake [177] lay against the south-eastern edge of the cut, approximately 0.24m to the south of [176]. The stake was set at an angle of *c* 45° and measured 120mm (length) x 20mm (diameter). Its top was at 2.06m OD.
- Resting against stake [177] and directly upon the side of the cut were three horizontally lain branches: [178] measured 230mm (length) x 20mm (diameter); [181] measured 500mm (length) x 10mm (diameter) and [182] measured 600mm in length by 10mm diameter. These all appeared deliberately lain, potentially being the rods of a small wattle structure.

4.5.2.3 Disturbed elements

Lying horizontally upon the base of the cut were 33 small wood fragments, likely to represent material which had been disturbed: [179], [180] and [183]–[190] (SG14). If they had once formed a part of the structure with the SG12 cut, they were no longer *in situ*.

4.5.2.4 Interpretation

Because of post-depositional disturbance, identification of the original use of the structure remains difficult. Its use as a retting pit in which flax or sometimes nettle stems were partly rotted prior to being worked into separate fibres for weaving has been tentatively suggested. This hypothesis may be testable provided relevant pollen and plat macro-remains survive in the bulk soil samples taken during the course of the excavation. Initial processing of a part of the sample from the deposit that directly *overlay* the timber remains in Period 5 (Peat [200] (SG15)) does contain substantial amounts of organic material.

4.6 Period 5: River migration

The SG12/SG13/SG14 structure fell out of use during a period of river migration and related inundation (SG15 and SG16).

Period 5 was not illustrated on plan as it was a uniformly extended across the excavation area, but see Fig 6.

The earliest infills of the structure were [263] and [200] (SG15). Context [263] was delimited by cut [242] an alluvial sandy clay. Context [200], within cut [239], was a firm dark brown peat [200], around 0.10m thick, which had a surface level of 2.06m OD. This filled the northern half of the cut and appeared as laminated bands, with organic fibres clearly visible. On site identification of reed fibres forming the bulk of the matrix was convincing and is likely to be indicative of the surrounding environment at the time of the deposit's formation. This peat may have formed *in situ* or possibly represents a detrital strandline deposit.

Peat [200] (SG15) was moderately rich in waterlogged seeds as well as straw-like stems. The waterlogged seeds confirmed the dominance of wetland (aquatic and bankside/marshland) environments and disturbed/waste ground habitats with little evidence for woodland/hedgerow species. The straw-like stems are indicative of local agricultural activity.

The second fill [241] (SG15), sealing [200], consisted of firm dark orangey brown clay that contained frequent organic fibres. It was around 0.10m thick with a surface level of 2.06m OD.

The composition of [200] and [241] contrasted sharply with the earlier Period 3 high-energy depositional sequence (sandbar deposits) and appears to indicate a drastically reduced flow regime. The most likely reason for this is the migration of the river channel, probably towards the north-west.

This lower energy environment is witnessed again with the deposition of overlying deposit filling the SG12/SG13/SG14 structure, [199/240], which extended approximately 1.00m beyond the northern edge of the structure's cut. This deposit consisted of a dark greyish brown clayey silt, 0.18m thick, with a surface level of between 1.98m to 2.15m OD. [199] included charred cereal grains, notably wheat, and rachis (or spike to which the spikelets and grains of cereals are attached) detached through free-threshing of wheat.

In the central area of the trench the Period 4 SG10/SG11 ditch was overlain by [167] (SG16), a dark grey, coarse granular sand that contained frequent small pebbles This

had a maximum thickness of 0.15m and a surface level of between 2.21m to 2.33m OD. It was a waterlain sand which subsequently developed an ephemeral soil horizon, probably resulting from plant colonisation. This deposit contained abraded pottery of Late Bronze Age date.

This layer contained abraded Late Bronze Age-Early Iron Age pottery fragments and a horse incisor. Both were unlikely to be *in situ* and were probably brought in by the river at the time the sand was deposited.

4.7 Period 6: historic river channel (active phase)

All of the deposits discussed in this period accumulated within the branch of a river (SG17), probably a meander that had migrated across the trench.

See Fig 5 and Fig 6.

Sediment formation was associated with the active channel phase, and represented a gradual accumulation of sediments within (SG18) and alongside (SG19) an increasingly inactive channel.

The ostracod assessment drew attention to the immature nature of the silty clay deposits in Period 6, indicating fairly continuous deposition, although the increasingly oxidised nature of these sediments reflect a lowering or at least a fluctuation in the water table at these levels. The rise and fall of the water table indicates that deposition within the channel occurred under conditions which permitted the wetting, and then drying and therefore oxidation of the sediments. This is likely to have occurred in a shallow water environment with a fluctuating water table, and is therefore consistent with the low energy environment envisaged in the phasing.

4.7.1 River channel

Cut [209] (SG17) represents the southern edge of a NE-SW aligned river channel that is believed to have represented the main artery of water flow (*thalweg*).

The edge of the *thalweg* was located in the north end of the central trench and continued throughout the whole of the northern trench. As revealed the edge appeared linear in plan with moderately shallow irregular sides and an uneven base.

It had truncated layer [167] in Period 5 and in places cut down to the underlying Pleistocene gravel. The recorded dimensions were 3.20m NE-SW x 13.55m NW-SE x 0.45m deep and the lowest point of the base was at 1.65m OD.

4.7.2 River channel fills (mid-late Roman)

The sequence of fills of the SG17 channel was complex with sediments being deposited not only within but also on the edge of, or outside of the limits of the channel itself. This complexity would be expected within an active river channel, which is continually carrying, depositing and eroding material at different rates at different periods and in different places. Together, the fills were SG18.

Context [166] (SG18) was the earliest deposit recognised within this sequence and was located on the south-eastern edge of the channel. It consisted of a 0.18m thick, soft mid brownish grey silty clay with occasional coarse sand lenses with some mineralisation. The surface level was between 2.40m to 2.23m OD. It contained a

small abraded pottery fragment of Late Bronze Age-Early Iron Age date. This deposit may represent a channel bar (or riffle) accumulating at the edge of the *thalweg* (Fig. 6).

Contexts [143/162] (SG18) overlay [166] within the northern and central sondages, and represent the same deposit: a soft dark grey to greyish brown clayey silt plus around 60% sub rounded to sub angular small pebbles with frequent lenses of coarse granular sand. The surface of this undulated significantly, ranging between 1.91m to 2.27m OD, and had a maximum thickness of 0.30m. The combined extent measured approximately 11.35m NW-SE x 2.54m NE-SW. This deposit probably represents accumulated channel bars deposited under a variable flow regime. The surface undulations may be the result of water turbulence.

Rich seed assemblages with high species diversity were present samples from clay silty sand deposit [143]. Wetland plants were present with moderate amount of beetle remains. Diatom taxa present reflect the presence of shallow freshwater, although the dissolved central area of a centric diatom was also identified. This latter fragment may be derived from the marine planktonic species *Paralia sulcata*, however, this identification is uncertain. The AMS radiocarbon date puts the accumulation of [143] in to the mid to late Roman period (AD 130 to 340).

Context [142] (SG18) was revealed within the northern trench and overlay deposit [143]. It consisted of a firm dark greyish brown silty clay plus around 20% sub rounded to sub angular small pebbles. The surface of this deposit also undulated greatly, ranging between 2.23m to 2.03m OD. The deposit as seen measured 10.45m NW-SE x 2.50m NE-SW and had a maximum thickness of 0.36m.

Context [141] (SG18) was also within the northern trench and is thought to have represented the final, uppermost, deposit within channel cut [209]. It overlay [142] and consisted of firm mottled mid greyish brown and mid reddish brown sandy clay which contained very frequent sub rounded small pebbles. The deposit as seen measured 10.80m NW-SE x 2.50m NE-SW and had a maximum thickness of 0.33m. The surface was between 2.40m to 2.24m OD.

Both [142] and overlying context [141] were clearly water lain and appeared to represent the gradual silting up of channel cut [209]. They are both characteristic of deposition either within a slow moving active channel or of the gradual silting up of an inactive channel.

Context [161] (SG18) was located within the northern and central sondages and overlay deposits [141]. It consisted of soft mottled mid greyish brown and mid brownish orange silty clay which contained very occasional sub angular pebbles and very occasional shell fragments. The deposit as seen measured 4.40m NW-SE x 2.50m NE-SW and had a maximum thickness of 0.31m. The surface was between 2.58m to 2.37m OD. It is thought to represent low energy alluvial deposition in cut [209] after it had become an occasional flood channel feature.

Context [140] (SG18) was also located within the northern and central sondages and overlay deposit [161]. It consisted of mottled light grey and light reddish brown clay that contained very occasional sub angular pebbles. It measured 10.00m NW-SE x 2.50m NE-SW and had a maximum thickness of 0.23m. The surface was between 2.66m to 2.35m OD. This deposit is also believed to represent an occasional flood channel feature fill.

4.7.3 Overbank deposition episodes (late Roman–mid Saxon)

The following depositional sequence consisted of contexts deposited directly to the south of the *thalweg* ([209]: the SG17 river channel). Despite their position these layers are likely to have formed as a part of the same active river system, probably as overbank depositional events. Together, the fills were SG19.

Alluvial clay [196] (SG19) was the earliest of these deposits. Samples from [196] preserved non-planktonic freshwater diatoms associated with flowing water. Ostracod analysis indicated a higher energy riverine environment, with some fringing vegetation. The pollen indicated an open environment, with the dominance of grasses. AMS radiocarbon dating places this context in the very late Roman/Early Saxon period (AD 390 to 560) which gives a terminus ante quem for the earlier periods/activity.

Overlying [196] were contexts [165/195] (SG19), revealed within the southern and central sondages and represent the same deposit. They consist of a soft mid brownish orange clay containing frequent small lenses of granular sand, which decreased towards the southwest (laterally sorted). The surface of this deposit was between 2.45m to 2.16m OD, and had a maximum thickness of 0.20m. The extent as seen measured approximately 24.10m NW-SE x 2.54m NE-SW.

Samples from [195] included charred plant remains (seeds), fragmentary and very poorly preserved beetle remains (aquatic and waterside mud species), weevil and water flea. The recovered remains are not at odds with the interpretation of the deposit as having accumulated in a quiet backwater or pool along the river margins. Cereal pollen along with some herbs were also present, indicating arable agriculture. The insect material had shown signs of erosion or rotting which could be because of intermittent flooding and weathering.

Context [115] (SG19) overlay deposit [165/195] and consisted of soft mottled mid grey and dark brownish orange clayey silt which contained very frequent small sub-rounded and sub-angular pebbles, which were also laterally sorted, decreasing towards the southwest. The surface was between 2.58m to 2.38m OD, and the layer had a maximum thickness of 0.20m. The deposit as seen measured 5.85m NW-SE; the NE-SW extent was not recorded. It contained a single sherd of residual Late Bronze Age pottery. Context [171] overlay deposit [115] and consisted of soft mottled mid greyish brown and mid brownish orange clayey silt containing occasional small pebbles. The deposit as seen measured 2.85m NW-SE, the NE-SW extend was not recorded. The surface of this deposit was between 2.58m to 2.41m OD, and had a maximum thickness of 0.11m.

Deposit [170] (SG19) overlay context [171] and consisted of a soft mid greyish brown clayey silt intermixed with around 30% coarse granular sand with occasional small pebble inclusions. The surface was between 2.68m to 2.40m OD, and had a maximum thickness of 0.15m. It measured 2.75m NW-SE, and the NE-SW extend was not recorded.

Context [164] (SG19) overlay deposit [170] and consisted of soft mid greyish brown silty clay containing occasional small pebbles and orange brown mineralisation flecks. The surface was between 2.67m to 2.45m OD, and it had a maximum thickness of 0.26m. The extent as seen measured 5.05m NW-SE x 2.54m NE-SW. Contexts [194/208] were revealed within the southern and central sondages and represent the

same deposit. They consisted of a soft mid orangey grey silty clay that contained frequent small pebbles and coarse granular sand. It measured 13.70m NW-SE x 2.54m NE-SW and had a maximum thickness of 0.25m. The surface level was between 2.78m to 2.25m OD. Iron stained roots observed within suggest vegetation growth and episodic drying, suggestive accumulation along marginal river fringes, possibly reed beds.

Deposits [163/193] and [207] were revealed in the southern and central sondages and are thought to be equivalent (SG19). They consisted of a soft mid brownish grey to mid orangey grey silty clay that contained frequent small pebbles and coarse granular sand. The deposit as seen measured 23.70m NW-SE x 2.54m NE-SW and had a maximum thickness of 0.23m. The surface level was between 2.86m to 2.25m OD.

Samples from [193] included moderate seed numbers, rove beetle, earthworm and water flea. Cereal pollen and herbs indicated arable agriculture. The pollen assessment again indicated a mature fen habitat for this deposit. With the earthworm capsules alongside water fleas, the lack of diatoms (probably through weathering), the mature fen and agriculture locally, the area was probably more stable and dryer than earlier contexts indicate and, although still prone to flooding, less frequently inundated by this time.

The radiocarbon date for [193] puts the accumulation of the deposit into the mid Saxon period (AD 720 to 740 and AD 770 to 970) – with the date of the underlying deposit [196] being very late Roman/Early Saxon period (AD 390 to 560), [193] was probably dated to the earlier part of the range AD 720 to 740 and AD 770 to 970.

4.8 Period 7: Pre-modern land surface

See Fig 6.

Contexts [139/160] and [192] (SG20) were revealed within the southern, central and northern sondages and represents the final phase of alluvial deposition, extending across the whole of the trench area.

The material consisted of soft greyish brown silty clay that varied in hue from light to dark and contained occasional small angular to sub angular pebbles plus very occasional shell fragments. The surface of the deposit was between 3.16m to 2.93m OD and had a maximum thickness of 0.60m.

Samples from [192] revealed moderate seeds and insects suggesting an aquatic input to the deposit still at this late stage, possibly during seasonal flooding events. This final phase of alluvial deposition had clearly undergone much post-depositional alteration and represents a post medieval subsoil.

Context [206] overlay this deposit and consisted of dark brownish black sandy clay containing occasional pebbles. The surface level was between 3.37 to 3.03m OD and had a maximum thickness of 0.35m. This deposit almost certainly represents a buried topsoil of post-medieval date.

4.9 Period 8: Modern made ground and associated features

See Fig 6.

Cut [211] was a N-S aligned linear feature located at the northern end of the central trench. It had near vertical sides and a flat base. The cut was 0.75m deep and approximately 0.55m wide. The base level was at 2.26m OD. The function of this cut is unclear. Fill [212] was the only deposit within [211]. It consisted of a dark brownish black clayey silt which contained quantities of post-medieval material, mainly ceramic building material fragments. The cut and fill were SG21.

Cut [145] was located at the northern end of the trench and only its southern edge was revealed within the trench and was aligned roughly NE-SW. It had a moderately steep irregular side and cut down into the underlying Pleistocene gravel. The cut was machine excavated to a depth of 0.85m but did not reach the base. The lowest level seen was at 1.72m OD. The function is unclear. Fill [144] was the only deposit within [145]. It consisted of mid brownish grey silty clay that contained quantities of post-medieval material, mainly ceramic building material and some slate fragments. The cut and fill were SG22.

Overlying the Period 7 buried topsoil and probable modern cuts described above was a series of post-medieval made ground deposits [147-158] (SG23), which had a combined thickness of around 4.82m.

These consisted of various layers of sands and chalk lenses containing quantities of ceramic building material, metal, ceramics and glass fragments. They seem likely to represent successive episodes of deliberate deposition that is thought to have formed part of a concerted effort to raise the original ground level. This may have been undertaken in conjunction with the canalisation of the existing waterways, creating flood free areas for subsequent industrial development.

The final layer in the sequence for this trench is context [146], which consisted of dark brown silty sand. This context, which was partly vegetated, contained pebbles, glass, metal and ceramic building material plus other building debris and represents the industrial abandonment of the area.

5 Quantification and assessment

5.1 Post-excavation review

In order to produce this report, a statement of the potential of the stratigraphic archive was produced (section 6). An assessment has been made (section 6.1) of the degree of realisation of the original research aims and of the research potential generated by this. An updated research design has also been produced (section 8), as has a chronological and contextual framework for the quantification and assessment of the finds and environmental data sets (section 9).

5.2 The site archive and assessment: stratigraphic

Tasks completed to date:

- Subgrouping completed
- subgroup matrix completed and checked
- subgroups allocated
- site matrices completed and checked
- all plans digitised in AutoCad
- all environmental material processed and assessed
- all finds processed and assessed

Type	Description	Quantity	Notes
Contexts	Combined evaluation and mitigation	111	
Plans	'A4' 1:20 (no. of sheets 15)	6	One multi context trench plan plus five single context plans.
Sections	'A4' 1:10	5	One complete east facing section of final step at trench base, one section of opposing section in centre of trench plus one representative sample section of overlying deposits (Fig 6).
Matrices		Yes	Digital and paper copies
Photographs		Colour	Total number of slides (includes duplicate images)

Table 1: Stratigraphic archive

The small assemblage of post-medieval material uncovered was not sufficiently diagnostic to merit retention.

5.3 Site archive and assessment: finds and environmental

This section registers the complete artefactual and soil sample record.

Building material	2 bags
Prehistoric pottery	4 bags
Roman pottery	2 bags
Accessioned finds	1 coin
Bulk soil Samples	11 bulk samples
Monolith tin	1
C14 samples	2
Animal Bone	1 box

Table 2 Finds and environmental archive, general summary

5.4 The prehistoric pottery

Mike Seager Thomas

5.4.1 Introduction

The prehistoric pottery assemblage from comprises 24 sherds weighing 249 grams, all highly weathered and/or burnt (Table 3).

Context	**Number of sherds**	**Weight in grams**	**Dating evidence**	**Spot date**
115	1	8	FMF	Late Bronze Age
167	1	45	FF, heavily gritted base in MCF	Late Bronze Age
197	1	36	base in FMF	Late Bronze Age
217	19	139	FMF, thin bodied, fingered sherds in MF	Late Bronze Age
Total	22	221		

Dates: Late Bronze Age=Late Bronze Age.

Pottery fabric types: FF=fine flint; FMF=fine to medium flint; MF=medium flint; MCF=medium to coarse flint. (All post Deverel-Rimbury/Late Bronze Age fabrics).

Table 3: The quantification and dating of the prehistoric pottery from PDZ3.35/36.

5.4.2 Description

The assemblage comprises mostly non-feature sherds in four flint-tempered fabrics, which together form a typical Thames Valley earlier post Deverel-Rimbury suite, dateable to the Late Bronze Age (between *c* 1150 and 800 cal BC: Needham 1996).

The pottery from [197] (SG05) and [217] (SG02) was from Period 2 and was *in situ*.

Otherwise the pottery was redeposited. The pottery from [115] was from the Period 6 overbank deposition (SG19) dated to the late Roman–mid Saxon, and was therefore redeposited. The single feature sherd, from [167], is a heavily gritted base of a type recurrent in assemblages of this period and was from the SG16 waterlain sand in Period 5 and was redeposited by river action.

5.4.3 Potential

Owing to the small size of the assemblages and the condition, which is strongly suggestive of secondary deposition, it has no research potential and, bar routine fabric analysis, no further work on it is recommended.

5.5 Romano-British Pottery

James Gerrard

5.5.1 Introduction

Three sherds of Romano-British pottery were recovered from context [201] (SG11), the fill of the SG10 ditch in Period 4. It was *in situ*.

5.5.2 Description

One of sherds of Romano-British pottery is a small fine oxidised sherd with mica dusting (LOMI) which can be dated to *c* AD70-120.

The remaining two sherds are larger but have lost their surfaces and are somewhat abraded. They would appear to be sandy greyware sherds, probably of local origin (SAND). They can probably be dated to *c* AD120-400.

5.5.3 Potential

The Romano-British pottery should be described and mentioned in any publication text but there is no need for further work or a formal pottery report.

5.6 Small finds

James Gerrard

5.6.1 Roman coin

SF1

An extremely worn and pitted 1st- or 2nd-century sestertius was recovered from [201] (SG11), the fill of the SG10 ditch in Period 4. It was *in situ*.

The remnants of an obverse portrait suggest Trajan (*r*. 98-117). This coin was probably struck after AD98 but may not have been lost until AD200-270.

5.6.2 Potential

The coin description should be included in the overall publication text on the site, preferably in context with the other Roman assemblages uncovered across the Lea Valley Olympics sites.

5.7 The ceramic building material

Kevin Hayward

5.7.1 Introduction

Two abraded examples of Roman ceramic building material were examined using the London system of classification with a fabric number allocated to each object (Table 4).

Context	Fabric	Layer	Form	Size	Date range of material		Latest dated material	
201	*3023*	Fill	Tiny fragment of Roman cbm	1	50	120	50	120
202	*3023*	Fill	Highly Abraded Roman Tile edge	1	50	120	50	120

Table 4 Distribution of Ceramic Building Material

5.7.2 Description

The Roman building material was recovered from [201] and [202] (SG11), the fill of the SG10 ditch in Period 4. It was *in situ*.

Both examples of ceramic building material that have been recovered and recorded from this trench have a fabric and form that is early Roman (AD50-120) in date.

This is interesting in itself but the fragments are tiny and highly abraded which indicates post-depositional exposure and transportation

5.7.3 Potential

There are no recommendations for further work, but the finds should be included in any publication of the archaeological sites of the Olympic development area.

5.8 Lithics

Barry Bishop

5.8.1 Introduction

The investigations recovered a single piece of burnt flint from context [217] (Table 5).

Context	Fabric	Layer	Form
217	*3117*	Layer	Burnt Flint

Table 5 Distribution of burnt flint

5.8.2 Description

The flint [217] (SG02) was from Period 2, and was *in situ*.

The flint consisted of a fragment from an alluvially rounded flint cobble weighing 18g of a type common in the vicinity of the site. It had been intensively burnt to the extent that it had changed to a light grey colour and had become extensively fire crazed.

The degree of burning would be consistent with it having been within a hearth for an extended period and thus indicates human activity associated with the buried soil or prehistoric land-surface from which it was recovered. It is, however, not dateable but would be consistent with the other evidence of later prehistoric activity associated with this deposit.

5.8.3 Potential

Although not closely dateable by itself, the burnt flint does indicate human activity and hearth use associated with the deposit from which it was recovered. The quantity present does not necessarily suggest intensive or sustained activity but most likely represents residual background waste

No further work on this piece is warranted but its presence should be noted in any reports generated from the investigations.

5.9 Timber

DM Goodburn

5.9.1 Introduction

At the south end of the trench at an OD height of *c* +2.10m what were the very disturbed remains of a roundwood structure [159] were identified in a shallow cut [239] (see cover and Fig 4).

It was partially revealed during the evaluation and then the deep narrow stepped-in trench was extended to the west to reveal the full extent of the waterlogged wood during excavation. Unfortunately, the additional information did not add significantly to our understanding of the feature.

This assessment is referenced against the background of a large corpus of recorded woodwork of prehistoric to recent date from east London.

5.9.2 The disturbed roundwood structure

The remains of clearly cut roundwood were found at the south end of the trench. Excavation demonstrated that some elements were either vertical or lying at 45 degrees whilst other material was horizontal.

The worked and possibly worked roundwood (group No. [159]) was confined to an irregular shallow cut only surviving c 0.20m deep [239]. The excavation clearly showed that any structural arrangement had been massively disturbed. It is very likely that this disturbance was the result of scouring during periods when the River Lea was in spate. Several excavations in the area have shown the scouring out of worked roundwood and this timber is a typical feature of worked wood assemblages in the Lea Valley.

The cut [239] extended beyond the west edge of the trench with a length of 3.20m NE-SW in the narrow trench. It had a width of *c* 1.70m.

In the north-east corner was what appeared to be the base of a wattle lining to the feature survived virtually *in situ*. This comprised three pointed stakes [175], [176] and [177]. The first two of which were made from small cleft ¼ poles *c* 60 x 40mm, whilst the last [177] was a whole small stem *c* 20mm in dia. The longest stake survived *c* 450mm long.

The base of the cut was strewn with small diameter regular rods, probably of coppiced origin. In the NE corner several regular rods were found between 20 and 10mm in diameter [181] etc, wedged behind one of the stakes, and were thus possibly *in situ*

5.9.3 Dating and possible function

This type of disturbed wattlework has no dateable features on technological grounds. Indeed, there are remnants of modern wattle revetments to the river Lea just *c* 80m north of the trench. Stratigraphically, the analysis of the site sequence has placed this feature in Period 4, with a Roman date.

As to a function for the structure, it is very tentatively suggested that a use as a retting pit in which flax (or nettle) stems were partially rotted prior to working into separate fibres for weaving is a possible use. Fresh or brackish water would have been employed for this process, in which shallow rough pits were required to contain the material.

5.9.4 Recommendations

A short updated summary of the disturbed wooden structure should be produced for publication.

Comparison with other similar features may be useful in particular with a rather similar wattle structure excavated at the MoLAS site at 150 Stratford High Street.

5.10 Environmental Samples and Geoarchaeological Records

Several visits were made by a MoLAS-PCA geoarchaeologist to examine, record and sample the natural sequence exposed within the evaluation trench. A sequence of monolith tins was taken from sections exposed in the trench and a series of bulk samples was also taken adjacent to the monolith tins to provide sediment of off-site examination. See Fig 6 for location of monolith tins.

The results of the monolith associated assessments are included in this section (below). Archaeological features, where excavated, were also sampled with bulks and/or monoliths, as appropriate. The results of the bulk sample associated

assessments are included under the Assessment of the Environmental Evidence section below.

5.10.1 Assessment of environmental evidence

5.10.1.1 Introduction

During excavations of Trench PDZ3.35/36, 11 environmental bulk soil samples were collected from the site for the potential recovery of plant remains, molluscs and insect remains, with the expectation that they might provide information on the local environment and evidence of human activity in the area.

The aim was to establish the presence and/or absence of macrofossil remains in a selection of the samples from key stratigraphic contexts and to establish whether a full assessment of various categories of environmental remains should be carried out on all or some of the bulk samples. This work stands alongside any environmental information resulting from analysis of the monolith samples and helps to look at environmental changes across the site, through space and time.

The bulk samples were taken from three sections; eight samples from the north-east facing section 30, from Pleistocene flint gravel [210], prehistoric clay [197], and overlying riverine sand deposit [198], historic clay silt deposit [199] and peat [200], historic clay gravel channel fill [193], and an alluvial deposit [192], part of the pre-modern land surface. Two other samples were assessed from the south-west facing section 28, from a clay deposit [197], part of the prehistoric (Late Bronze Age/early Iron Age) land surface, and the upper sandy fill [201] of a Roman/medieval ditch [213]. The remaining sample was collected from south-west facing section 26, from clay silty sand [143], part of a historic river deposit.

The size of the samples ranged from ten to 30 litres with most of the samples being 20 litres. For the evaluation, five litres from each sample was processed by flotation using sieves of 0.25mm and 0.5mm for the recovery of the flot and residue respectively. Nine litres of each of the assessment samples was also processed by flotation onto a 0.25mm sieve followed by wet-sieving of the residue through a 0.5mm sieve; and additional litre from each of these samples was also wet-sieved to 0.25mm for the potential recovery of molluscs. Furthermore, 2 litres was wet- sieved through a 300mm sieve in preparation for insect assessment. Between five and 15 litres of soil from all the samples was retained for the potential recovery of further botanical or other biological remains on the basis of the assessment results.

5.10.1.2 Plant Macrofossils

John Giorgi

Eight of the nine samples produced organic flots; sample 76 from a sandy ditch fill [201] yielded no remains. The size of the flots ranged from 3ml to 200ml although most of the flots were small, being 50ml or less. The flots were divided into fractions using a stack of sieves and scanned using a binocular microscope with the item frequency and species diversity of all biological remains being recorded using the following rating system of 1 to 3:

- Frequency: 1 = 1-10 items; 2 = 11-50 items; 3 = 50+ items
- Diversity: 1 = 1-4 species; 2 = 5-7 species: 3 = 7+ species

The results from the assessment showing all biological materials from the flots and residues and any other remains are shown in Table 6.

5.10.1.2.1 CHARRED PLANT REMAINS

Seven samples contained varying amounts of flecks and small fragments of charcoal, with three samples containing potentially identifiable fragments from clay deposits [197] and [217] and [195]. Occasional charred cereal grains were noted in clay deposit [217], with a moderate amount in clay silt layer [199]; these grains included wheat (*Triticum* spp.). A few rachis fragments from free-threshing wheat were also noted in clay silt layer [199].

5.10.1.2.2 WATERLOGGED PLANT REMAINS

All ten productive samples produced varying amounts of botanical remains preserved by 'waterlogging' or in an anoxic environment, with these assemblages including fruits and seeds, wood and straw-like stem fragments and roots/rootlets.

Variable amounts of wood were present in all the samples, although the material was very fragmented, with larger pieces including twigs noted in just one sample from sand deposit [198]. There were also small amounts of possible straw fragments noted in two samples from clay silt deposit [199] and peat [200]. Occasional to large amounts of 'waterlogged' roots were present in nine of the ten samples.

Identifiable seeds and fruits were present in all ten samples. Rich seed assemblages with high species diversity were present in three samples, from sand deposit [198], clay silt deposit [199] and clay silty sand deposit [143]. There were moderate seed numbers in five other samples, with less than 100 seeds but with fairly good species diversity; these assemblages were from sandy gravel [210], clay deposit [217], peat [200], clay gravel [193] and clay sand deposit [195], and alluvium [192].

The 'waterlogged' seeds and fruits were mainly from plants of wetland (aquatic and bankside/marshland) environments, and disturbed/waste ground habitats with little evidence for woodland/hedgerow species.

Wetland plants were present in all the seed assemblages but particularly in the assemblages from clay silt deposit [199] and clay silty sand deposit [143], with often a very wide range of species being represented. There were aquatics including pondweeds (*Potamogeton* spp.), horned pondweed (*Zanichellia palustris*) and stoneworts (*Chara* spp.), and plants from a wide range of wetland habitats (rivers, ponds, lakes, ditches, marshes and fens) including water plantain (*Alisma* spp.), water dropworts (*Oenanthe* spp.), bogbean (*Menyanthes trifoliata*), spike-rushes (*Eleocharis* spp.), celery-leaved crowfoot (*Ranunculus sceleratus*), gypsy wort (*Lycopus europaeus*), sedges (*Carex* spp.) and rushes (*Juncus* spp.).

Plants of disturbed (including cultivated) ground and waste places, included goosefoots (*Chenopodium* spp.), oraches (*Atriplex* spp.), docks (*Rumex* spp.), various *Polygonum* species, chickweeds (*Stellaria media* gp.), stinging nettle (*Urtica dioca*), prickly sow-thistle (*Sonchus asper*) and corn marigold (*Chrysanthemum segetum*). Some of these weeds are indicative of nitrogen rich soils, which may point to human activity close-by. There were other wild plants that may be found in various habitats including disturbed/waste ground and grasslands, for example thistles (*Carduus/Cirsium* spp.), buttercups (*Ranunculus acris/repens/bulbosus*), and indeterminate grasses (Poaceae indet.).

The presence of elder (*Sambucus nigra*) and brambles (*Rubus* spp.) seeds may point to hedgerow vegetation although the remains may represent food residues. An interesting find was the presence of fig (*Ficus carica*) seeds in the sample from prehistoric clay deposit [217].

Context	Sample	Phase	CHD	CHD	CHD	WLG	WLG	WLG	Comments
			Grain	Chaff	Wood	Seed	Roots	Wood	
210	58	1			1 1	2 2	3 1	3 1	Mod nos seeds (30-50); mod spp div; all spp recorded
197	59	2			3 1	1 1	2 1	2 1	Virtually no id'ble plant remains; mainly v frag charcoal (occ poss id'ble frag)
217	68	2	1 1		3 1	2 2	2 1		Mainly v frag charcoal (2 poss id'ble fgs in residue); occ chd grain & frags; 2 flots
198	60	3				3 3		3 1	Rich seeds (c 100) & rich spp diversity (>ELE, RAN); virt all species recorded; wl wood (large & small frags)
199	66	5	2 1	1 1	2 1	3 3	2 1	1 1	Good charred assemblage; rich wl assemblage esp wetland plants; some dist/waste gd; ?wl ?straw/stems
200	67	5			2 1	2 1	3 1		Mod nos wl seeds; ?straw/stems
143	80	6				3 3	3 1	2 1	Rich seed assemblage;>wetland plants (aquatic bankside)(>ZANPA,ALI,PTM);dis t gd; moderate beetles(c50); good preservation
193	63	9			2 1	3 3	2 1	2 1	Mod no seeds (40-60) & mod spp div (all species recorded); >MEN
195	61	9			3 1	3 3		3 1	Mod nos seeds(50-100); mod high spp div; all species recorded; >flecks charcoal/wood (id'ble charcoal frags)
192	64	7				2 2	2 1	2 1	Mod nos seeds/spp diversity (all species recorded
Frequency: 1 = 1-10 items; 2 = 11-50 items; 3 = 50+ items; Diversity: 1 = 1-4 species; 2 = 5-7 species: 3 = 7+ species									

Table 6: Plant macrofossil remains

5.10.1.2.3 SUMMARY AND GENERAL DISCUSSION

Virtually all the samples from Trench PDZ3.35/36 produced 'waterlogged' botanical assemblages, with identifiable charred plant remains in just two flots.

There were rich 'waterlogged' botanical assemblages (with high seed frequencies and moderate to high species diversity of identifiable remains) in only three of the ten productive samples although another five samples produced moderate sized assemblages. The 'waterlogged' plant remains consisted mainly of fragmented wood and identifiable fruits/seeds, all from wild plants, but particularly from plants of wetland (aquatic and bankside/marshland) and disturbed (including cultivated) ground/waste places. Fragmented charcoal was recorded in seven samples, with identifiable fragments in three, and a moderate amount of cereal remains in one sample and occasional grains in another.

5.10.1.2.4 CHRONOLOGICAL ASSESSMENT OF THE RESULTS

A chronological assessment of the results shows the presence of moderate and/or rich amounts of identifiable botanical remains in all the sampled phases of the site, which will allow for an investigation into the general changing character of the environment over time and occasionally information on human activities. Detailed reconstruction, however, will be better in some phases than in others. Thus, there were only moderate amounts of identifiable remains in one sample (sandy gravel [210]) from the earliest Period 1 (Pleistocene gravels), while occasional charred plant material (identifiable charcoal and occasional cereal grains) from Period 2 (Prehistoric land surface) samples (clay deposits [197] and [217]) may allow only general comments on human activities in the area at this time. The presence of small fig seeds in a sample from a prehistoric context is interesting but there is the strong likelihood that the remains are intrusive.

The sample from sandy deposit [198], Period 3 (river encroachment), and the six samples from historic deposits, all produced rich or moderately rich 'waterlogged' assemblages, allowing better environmental reconstruction, while there was also a moderately good charred cereal assemblage in the sampled clay silt [199] from Period 5, which may provide information on agricultural activities in the area.

Only small amounts of other biological (insect, mollusc) remains were present in the samples, with the exception of a moderate amount of beetle remains in sample 80 from clay silty sand deposit [143] (Period 6).

5.10.1.3 Insects

Enid Alison

5.10.1.3.1 METHODOLOGY

Six two-litre sub-samples washed to 0.25mm were submitted for assessment. The sub-samples were processed by paraffin flotation to extract insect remains following the methods described by Kenward *et al*. (1980, 1986) with flots recovered on 0.3mm mesh. The flots were scanned for the presence of insects and other invertebrates using a low-power microscope (x10 – x50).

Abundances of various groups were estimated, and the state of preservation assessed. Nomenclature for Coleoptera follows Duff (2008).The flots are currently stored in industrial methylated spirits in plastic jars.

5.10.1.3.2 RESULTS

The results of the assessment are presented in context number order. Archaeological information provided by the excavator is given in square brackets.

Context 192, sample 64 [Uppermost alluvial deposit overlying 193].

This may have formed the subsoil beneath the soil buried by Victorian and modern ground raising activity]. The flot had a volume of ~2ml. A very small quantity of invertebrate material was recovered. This consisted of several water flea ephippia (Cladocera: resting eggs), the fragmentary remains of at least two species of fly puparia (Diptera), and a few poorly preserved undiagnostic beetle fragments.

Context 193, sample 63 [Clayey deposit probably representing the silting up of the historic river channel].

The flot had a volume of ~2ml. A head of a rove beetle (Staphylininae), an egg capsule of an earthworm (Annelida) and a water flea ephippium were recovered.

Context 195, sample 61 [Gravely clay deposit which probably accumulated in a quiet part of the river in historic times, either in pools or hollows in the river bed or in backwaters along its margins].

The flot had a volume of ~5ml. A small number (estimated 10 individuals) of fragmentary and very poorly preserved beetle remains was recovered. They included *Helophorus* an aquatic beetle, *Dryops* found on waterside mud, *Cercyon* or *Megasternum*, a click beetle (Elateridae), and at least two species of weevil (Curculionidae). There was a single water flea ephippium. Traces of charcoal were noted among the small quantity of plant material recovered.

The assemblage is too small to provide environmental data, although *Dryops* implies mud at water margins and the recovered remains are not at odds with the interpretation of the deposit as having accumulated in a quiet backwater or pool along the river margins. A very much larger sample (20 litres +) would need to be processed to obtain a reasonably sized beetle assemblage. Even then, the potential for analysis would be limited by the very poor condition of the remains.

Context 197, sample 59 [Deposit overlying prehistoric soil/land surface 262].

The flot recovered was extremely small (~1ml). It included a few scraps of poorly preserved insect cuticle all of which were undiagnostic.

Context 198, sample 60 [Dark blackish-grey fluvial sand layer representing the encroachment of a river across the former dry land surface].

This may have been deposited initially during a large-scale flooding episode.] The flot had a volume of ~2ml. Water flea ephippia were common (~20) and two species were represented. Beetle remains were present and although all were fragmentary, the majority (75%) showed few signs or chemical erosion or rotting. The assemblage (estimated 10 - 15 individuals) included a water beetle *Helophorus*, *Anotylus rugosus*, *Corticarina* or *Cortinicara*, Aleocharinae sp., a weevil (Curculionidae), *Aphodius*, and two species of ground beetle (Carabidae). Fragments of earthworm egg capsules, several mites (Acarini) and a parasitic wasp (Hymenoptera Parasitica) were also present.

The relative abundance of water flea ephippia suggests an input of material from an aquatic environment into the deposit. The beetle assemblage as it stands is too small to make a significant contribution to the interpretation, although there were indications of damp, marshy habitats - one of the ground beetles was *Pterostichus* sub-genus *Pseudomasoreus*, all members of which are strongly hygrophilous (Luff 2007, 114-115). Most *Aphodius* are associated with herbivore dung but some species are also found in foul vegetable detritus and flood refuse (Jessop 1986). *Anotylus rugosus* is a decomposer that is often but not exclusively found in waterside habitats.

A much larger sample of sediment (up to 20 litres) would have to be processed to obtain a reasonably sized beetle assemblage for analysis. Beetle remains from this deposit were in a better state of preservation than in all the other samples assessed, but all sclerites recovered were very fragmentary which provides difficulties for specific identification.

Context 217, sample 68 [Prehistoric soil/land surface with Late Bronze Age-Early Iron Age pot sherds].

The flot was extremely small (~1ml). No insect or other invertebrate remains were recovered.

5.10.1.3.3 CONCLUSIONS AND RECOMMENDATIONS

The paraffin flots produced from the six sub-samples were extremely small. Small quantities of identifiable insect remains were recovered from two of the sub-samples (context 195, sample 61; context 198, sample 60).

The material recovered was fragmentary and poorly preserved, especially in context 195 where all sclerites showed evidence of erosion and rotting, making identification problematic.

The recovered assemblages were too small to provide significant environmental data, although neither was at odds with the interpretations provided by the excavator for each deposit.

Remains of other invertebrates were noted when present. Water flea ephippia were recovered from four of the sub-samples, but were only common in context 198 suggesting an aquatic input to the deposit.

Three litres of unprocessed sediment is available from each of the samples. Given the low numbers and state of preservation of insect remains in the sub-samples assessed, it is unlikely that further processing of this amount of sediment will produce sufficient insect material to provide detailed environmental information or aid interpretation of the deposits. It is estimated that processing of a minimum of 20 litres of sediment would be necessary to provide a reasonably sized, albeit fragmentary, insect assemblage from context 198.

5.10.1.4 Mollusc remains

Alan Pipe

This report identifies, quantifies and interprets the invertebrate remains from wet-sieved contexts [143], [192], [193], [195], [197], [198], [201], [210] and [217].

Each sample was inspected for the presence of crustaceans and molluscs.

Unfortunately, no molluscs or crustaceans were recovered from any sample processed.

5.10.2 Assessment of the geoarchaeological evidence

5.10.2.1 Introduction

A sequence of two monolith tins (sample <65>) was taken from the north east facing section 30 at the north end of the trench and one monolith tin (sample <77>) from the south-west facing section 26 and a series of bulk samples was also taken adjacent to the monolith tins to provide sediment of off-site examination of deposit characteristics macrofossils, microfossils and radiocarbon dating, as described below. See Fig 6 for location of monolith tins.

Each monolith tin was plotted on the section drawing and related to Ordnance Datum (OD) by the supervising archaeologist. The monolith tins were then sealed and

together with the bulk samples were transported to the MoLAS Environmental laboratories.

5.10.2.2 Sediments

Sediments sampled in the monolith tins were recorded in the laboratory and subsamples were taken for further analysis. See Fig 6 for location of monolith tins. All the monolith tin samples were described using standard sedimentary criteria (relating to colour, compaction, texture, structure, bedding, inclusions, and clast-size) and the nature of the contacts between adjacent distinct units was noted. The descriptions of the monolith tin samples are tabulated as follows:

Elevation and thickness of unit	***Trench:OL-04307 PDZ3.35/6 Monolith Sample: <65> Sedimentary description***	***Context***	***Microfossil subsamples***
+2.63mOD to +2.23mOD	Firm grey brown SILTY CLAY, with Fe concretions and occasional coarse sand. This unit becomes softer and grittier at the base (195). Contact with unit below is clear and horizontal.	193 194 195	Pollen Diatom Ostracod (193 &195) AMS (193)
+2.23mOD +2.05mOD	Very dark brown, firm organic SILTY CLAY with sand and fine gravel. Wood fragment at base. Contact with unit below is clear and sloping.	196 199 200	Pollen Diatom Ostracod AMS (196)
+2.05mOD to +1.99mOD	Moderately consolidated lens of yellowy orange (iron stained) gritty sand. Contact with unit below is clear and sloping.	198	
+1.99mOD to +1.81mOD	Firm, mid brownish grey SILTY CLAY with gravel and sand. Occasional Fe concretion. Contact with unit below is clear and horizontal.	197	Pollen Diatom Ostracod
+1.81mOD to below tin	Firm, mid greyish brown SILTY CLAY with coarse sand and angular to rounded gravel.	262	Pollen Diatom Ostracod

Table 7: Sedimentary description of Monolith sample <65>

Elevation and thickness of unit	***Trench:OL-04307 PDZ3.35/6 Monolith Sample: <77> Sedimentary description***	*Context*	*Microfossil subsamples*
+2.285mOD to +2.21mOD	Light greenish grey oxidised SILTY CLAY with occasional gravel clasts and organics. Contact with unit below is clear and slightly dipping.	141	Pollen Diatom Ostracod
+2.21mOD +2.11mOD	Light greenish grey partially oxidised SILTY CLAY with occasional gravel clasts and organics. Contact with unit below is clear and slightly dipping.	142	
+2.11mOD to +1.86mOD	Dark grey brown CLAY SILT, with occasional coarse shell, bone and entrained organic material. Contact with unit below is clear and slightly dipping.	143	Pollen Diatom Ostracod AMS
+1.86mOD to below tin	Soft dark grey green CLAY with gravel and sand; poorly sorted. Contact with unit below unseen.	215	Pollen Diatom Ostracod AMS

Table 8 Sedimentary description of Monolith sample <70>

5.10.2.3 Microfossils

Sub-samples for microfossil assessment including diatoms, ostracods and pollen were taken at selected locations within key sedimentary units. The aim of assessment was to determine the preservation, presence, abundance and diversity of the microfossils within the profile and provide valuable information about the evolving past environment (for example, vegetation, water characteristics, and indirect evidence for human activity, in particular landscape clearance, cultivation and other disturbance), which is likely to be complimentary to the macro-remains from bulk samples.

Preservation in the alluvial clay may be poor, as a result of oxidation and weathering, however. The survival and potential of microfossils in the deposits (as sampled in the monoliths) needs to be assessed as a further stage of work.

5.10.2.3.1 DIATOMS

Nigel Cameron

Eight sediment samples have been assessed for diatoms. These were subsampled from two monolith samples (<77> and <65>) taken from Trench PDZ3.35/36.

Methodology

Diatom preparation followed standard techniques (Battarbee 1986, Battarbee et al. 2001). Coverslips were made from each sample and fixed in Naphrax for diatom microscopy. A large area of the coverslips on each slide was scanned for diatoms at magnifications of x400 and x1000 under phase contrast illumination.

Diatom floras and taxonomic publications were consulted to assist with diatom identification; these include Hartley *et al.* (1996) and Krammer & Lange-Bertalot (1986-1991). Diatom species' salinity preferences are discussed using the classification data in Denys (1992), Vos & de Wolf (1988, 1993) and the halobian groups of Hustedt (1953, 1957: 199), these salinity groups are summarised as follows:

1. Polyhalobian: >30 g l^{-1}

2. Mesohalobian: 0.2-30 g l^{-1}

3. Oligohalobian - Halophilous: optimum in slightly brackish water

4. Oligohalobian - Indifferent: optimum in freshwater but tolerant of slightly brackish water

5. Halophobous: exclusively freshwater

6. Unknown: taxa of unknown salinity preference.

Results and Discussion

The results of the diatom evaluation for Trench PDZ3.35/36 are shown in Table 9 and the diatom species recorded are shown in Table 3 along with their halobian classifications.

Context	Diatom numbers	Quality of preservation	Diversity	Assemblage type	Potential for % count
141	absent	-	-	-	none
143	very low	very poor	low	fw/aero/pos.mar	none
215	very low	very poor	low	fw/aero non-plankton	none
193	absent	-	-	-	none
195	absent	-	-	pos. indet. pennate	none
196	moderate	poor/moderate	mod.high	fw/aero/pos. bk	good
197	absent	-	-	-	none
262	very low	very poor/poor	low	fw/aero	none

(fw – freshwater, bk – brackish, mar – marine, halophil – halophilous, aero – aerophilous)

Table 9: Summary of diatom evaluation results

Diatoms are absent from the top sample (context 141, 2.22 m OD) assessed from monolith sample <77>. In the two lower samples diatoms are present in very low numbers and the quality of diatom valve preservation is very poor. Species diversity is low. However, the diatom taxa present at both 2.06 m OD (context 143) and 1.80 m OD (context 215) reflect the presence of shallow freshwater. There is an absence of freshwater diatom plankton and there is a component of desiccation-tolerant aerophilous diatom species (*Pinnularia major*, and some other *Pinnularia* spp., *Ellerbeckia arenaria*) as well as attached, often epiphytic, diatoms (*Cocconeis placentula, Gomphonema angustatum, Synedra ulna*). In the sample at 2.06 m OD (context 143) the dissolved central area of a centric diatom was identified. This fragment may be derived from the marine planktonic species *Paralia sulcata*, however, this identification is uncertain.

In the sequence of five samples from Monolith 65 diatoms are absent from two samples (context 193, 2.56 m OD; context 197, 1.93 m OD). In context 195 (2.28 m

OD) a possible pennate diatom fragment was recorded, but otherwise diatoms are absent from this sample. In context 262 (1.72 m OD) a very low number of poorly-preserved diatoms are present and the assemblage is of low diversity. However, a benthic freshwater diatom *Navicula* cf. *trivialis* is present as well as the non-planktonic freshwater species *Synedra ulna*. Again aerophiles are present (*Hantzschia amphioxys, Pinnularia* sp.).

In only one sample (context 196, 2.17 m OD) from the two monolith sequences assessed for diatoms from PDZ3.35/3.36 is the diatom assemblage suitable for percentage counting. In this sample there are moderate diatom numbers and moderately high species diversity. The quality of diatom preservation varies from poor to moderately good. The diatom assemblage in this sample is dominated by non-planktonic freshwater species including *Achnanthes lanceolata, Cocconeis placentula* and *Gomphonema angustatum*. Also present is the freshwater non-plankton species *Meridion circulare* that is associated with flowing water. Aerophiles such as *Hantzschia amphioxys, Ellerbeckia arenaria, Pinnularia major* and *Pinnularia subcapitata* form a significant component of this diatom assemblage. Elevated conductivity is indicated by the presence of halophiles such as *Diploneis ovalis, Navicula cincta* and the planktonic species *Cyclotella meneghiniana*. A tentative identification was made of a poorly preserved fragment resembling the mesohalobous (brackish-marine) diatom *Nitzschia navicularis* and also a possible *Thalassiosira* sp. valve.

The poor preservation, absence or low numbers of diatoms in seven of the eight samples assessed for diatoms is the result of taphonomic processes. Where diatom remains are present both silica dissolution and valve breakage (Beyens & Denys 1982) are apparent and, as well as physical processes causing breakage, this may have been the result of factors such as extremes of sediment pH, the under-saturation of sediment pore water with dissolved silica, cycles of prolonged drying and rehydration, or exposure of sediment to the air (Flower 1993; Ryves *et al.* 2001).

Conclusions

Diatoms were identified in four of the eight samples evaluated from two monoliths in Trench PDZ 3.35/3.36. However, as a result of low diatom numbers, poor preservation and low species diversity, three of these diatomaceous samples have no potential for further analysis. A single sample from Monolith 65 (D3, 2.17 m OD) has good potential for percentage diatom counting to be carried out.

The diatom assemblages in both monolith 77 and 65 are comprised predominantly of non-planktonic species associated with shallow freshwater with both attached (epiphytic) and benthic taxa present. These assemblages also have an aerophilous component. A diatom species, *Meridion circulare*, which is associated with flowing water, is present in Monolith 65 (context 196, 2.17 m OD).

In two samples (Monolith 77, context 143, 2.06 m OD ; Monolith 65, context 196, 2.17 m OD) polyhalobous, and mesohalobous and halophilous diatoms respectively may be present. However, these identifications are based on very poorly preserved valve fragments.

5.10.2.3.2 OSTRACODS

John Whittaker

Eight sediment samples have been assessed for ostracods. These were subsampled from two monolith samples (<77> and <65>) taken from Trench PDZ3.35/36. See Fig 6 for location of monolith tins.

Methodology

Each sample was weighed and then thoroughly dried in the oven. Boiling water was then poured on the sample and a little sodium carbonate added to help remove the clay fraction on washing. It was then left to soak overnight. Breakdown was readily achieved when washed with hot water through a 75 micron sieve. The resulting residue was finally decanted back into the bowl for drying in the oven. When dry the sample was stored in a labelled plastic bag. Examination of the residue was undertaken under a binocular microscope. First the residue was put through a nest of dry sieves (>500, >250 and >150 microns) and then sprinkled out a fraction and a little at a time onto a tray.

Results

The results were most disappointing and very little, apart from some general observations, can therefore be made in the way of environmental reconstruction.

The five samples from Monolith 65 did not contain any ostracods. Four contained plant remains (and seeds), one contained insect remains and at least one contained charcoal. Many of the samples are coarse, often gravely sand (with very angular grains). This seems to suggest immature sediment in a high energy riverine environment, with some fringing vegetation. The charcoal, if confirmed, would indicate either natural or man-made fire in surrounding grassland. The lowest sample (Context 262) contains iron mineral and iron tubes, which suggest a drier phase and weathered surface. The uppermost sample contains both iron tubes and blue-grey gleyed clay, which suggests alternative weathering and waterlogging. There are no earthworm granules (indicative of subsequent soil formation), however, nor anything calcareous at all in any of the samples.

Two of the three samples from Monolith sample 77, from contexts 141 and 143, were similarly devoid of any calcareous component and would seem to represent a similar environment to that seen throughout most of Monolith 65. What is different and interesting is Context 215 (at +1.80m O.D.), the lowest sample in the sequence. Here we have a coarse gravely sand again with quite a lot of plant debris, but this time it contains calcareous microfossils in the form of molluscs (albeit scraps), charophyte oogonia and freshwater ostracods. The ostracods are rare and only *Cypria ophtalmica* perhaps offers an ecological clue, as the species lives prefers still, even stagnant water. This is contradicted by the presence of charophytes, however, which live in pure, clear water. The phasing (above) describes these pebbly clays of Context 215 as being the equivalent to Context 262 in Monolith <65>, having been originally deposited in the Late Glacial or early Holocene times but then subsequently subject to soil formation, thus forming a prehistoric soil/land surface; it also contains quite a lot of prehistoric pottery. Contexts 262 and 215, in reality, produced very different organic remains. On one hand, earthworm granules might be expected in both contexts if they really did represent land surfaces (although these granules can become decalcified); on the other, if a former landscape had become inundated by rising river levels, the resulting ponding back and flooding might be expected to produce an assemblage like that one found in Context 215, particularly if pools of

water developed across it. These interpretations nevertheless must, for the moment, remain uncertain.

The absence of any calcareous matter almost throughout in both monoliths suggest decalcification, or some ecological parameter that was detrimental to calcareous-shelled organisms living there in the first place. It is assumed the riverine environment was entirely freshwater, not tidal. Agglutinating foraminifera which occur extensively in brackish marshes and make their shell (test) from mineral grains cemented onto an organic membrane and which would survive in the most reducing of environments, were not found in spite of a diligent search.

5.10.2.3.3 POLLEN

Rob Scaife

Eight sediment samples have been assessed for pollen. These were subsampled from two monolith samples (<77> and <65>) taken from Trench PDZ3.35/36. See Fig 6 for location of monolith tins.

Methodology

Standard pollen extraction techniques were used on samples of 2ml volume (Moore and Webb 1978; Moore *et al.* 1992). More detailed extraction procedures are given in appendix 1. Pollen was identified and counted using an Olympus biological research microscope fitted with Leitz optics. Total pollen (assessment) sums of between 100 and 200 grains per level were identified and counted. Percentages have been calculated as follows:

Sum =	% total dry land pollen (tdlp) (incl. Alnus)
Marsh/aquatic =	% tdlp + sum of marsh/aquatics
Spores =	% tdlp + sum of spores
Misc. =	% tdlp + sum of misc. taxa.

Absolute pollen numbers were calculated using the addition of a known number of exotic spikes (Lycopodium) to the known volume of sample (Stockmarr 1971). Taxonomy in general follows that of Moore and Webb (1978) modified according to Bennett et al. (1994) for pollen types and Stace (1992) for plant descriptions. These procedures were carried out in the Palaeoecology Laboratory of the School of Geography, University of Southampton.

Results

Pollen was recovered from all of the samples taken from both profiles. In all cases, herbs form the dominant component (90-95%) with only small numbers of trees and shrubs (5-10%). Absolute pollen numbers are, in general, considered to be small. Pollen preservation is very variable due to the minerogenic, alluvial nature of the sediments.

Monolith Sample <65> Section 30; 1.72m.OD (262) to 2.56m.OD (193): Absolute pollen numbers were calculated at between *ca.*12,200 grains/ml in the lowest at 1.72m.OD (262) to *ca.* 117,000 grains/ml at 2.17m.OD (195).

Tree and shrubs types include *Quercus* (oak), *Alnus* (alder) and *Corylus avellana* type (hazel) have continuous but small numbers throughout. There are sporadic occurrences of *Betula* (birch), *Pinus* (pine), *Tilia* (lime).

Herbs types include Poaceae (grasses) are dominant (to 76%) with fluctuating but high numbers of Lactucoideae (dandelion types; peak to *ca.* 60%).

Also of note, are peaks of Chenopodiaceae (goosefoots and oraches) in the basal sample (15%) and Cereal type above (195) 2.17m.OD (to 18%). The latter may, however, include large grains of non-cereal Poaceae. Marsh and aquatic types include Cyperaceae (sedges) are dominant, increasing in value up profile to a maximum 20% (sum + marsh). There are small numbers of *Typha angustifolia* type (bur-reed and reed mace), *Iris* and cysts of freshwater, algal *Pediastrum.* Spores comprise largely *Pteridium aquilinum* (bracken; to 20%) and monolete Pteropsida (*Dryopteris* type) with some *Polypodium vulgare* (polypody fern) and occasional *Sphagnum* (bog moss) and Liverworts.

Monolith Sample <77> Section 26; 1.80m.OD to 2.22m.OD: Three pollen samples were analysed. Absolute pollen frequencies range 22,500 grains/ml in the lowest level (1.80m.OD) to 41,150 in the highest level (2.22m.OD). As with column <65> pollen preservation was found to be variable. The overall palynological characteristics of this column are also similar to <65> with dominance of herbs with few trees and shrubs. In all three samples, Poaceae are dominant (to 65%). Other herbs include Tubuliflorae (*Bidens* type; to 6%) and Cereal type (to 10%, *Sinapis* type (charlocks; 1%) and *Plantago lanceolata* (ribwort plantain; 1%). There is a moderate herbaceous diversity (22 taxa). Contrasting with <65>, Lactucoideae numbers are fewer. Marsh types include Cyperaceae (14%) and *Typha angustifolia* type. Spores include *Pteridium aquilinum* (11%) and *Dryopteris* type (6%). Derived geological palynomorphs are present in the lower levels (14% sum + misc.).

Interpretation

Interpretation of the pollen data can be viewed primarily in terms of the on-site vegetation and resultant pollen component, and also that derived from farther afield. Here, the taphonomy includes both airborne and fluvial transport.

These two profiles have been placed within a period of alluvial transgression over a prehistoric land surface. This is reflected in the pollen assemblages. Minerogenic alluvial sediments, if they contain pollen at all, show extremely variable pollen numbers and preservation. This is due to reworking of pollen eroded from interfluves, transported and re-deposited in overbank deposition onto river floodplains (Burrin and Scaife 1984; Scaife and Burrin 1992). Here, this is manifested by the substantial numbers of Lactucoideae in sample <65>, a taxon which is frequently over represented in poor pollen preserving environments and reworked geological palynomorphs. Other less robust taxa (e.g. grasses) are, however, also present which attest to less severe modes of transport and deposition.

Overall, the environment was one of open character both on the river floodplain and on the interfluves. Both profiles show substantial importance of grassland. Poaceae recorded will have come from on-site (fen) community and from the interfluves where presence of ribwort plantain (albeit in small numbers) suggests dry grassland, possibly pasture. Cereal pollen in contexts (195) and (193) along with some herbs (Asteraceae types and *Polygonum aviculare*) may also indicate that there was some arable agriculture. The latter is also the case throughout column <77> where cereal type pollen is present along with typical weeds of disturbed ground which include blue cornflower (*Centaurea cyanus*), Asteraceae types, black bindweed (*Fallopia*

convolvulus), charlocks (*Sinapis* type) and nettle (*Urtica* type). There is no evidence for any substantial growth of woodland on or near the site or in other areas where fluvial transport of pollen has taken place. Pollen of oak and hazel are, however, present throughout and are considered to represent the wide regional occurrence of this remaining woodland. The sporadic occurrences of birch, pine and alder are similarly not considered to be of any local significance because all of these taxa produce copious quantities of wind dispersed pollen.

The sediments are stratigraphically complex with sediment types interpreted as deposition under a number of regimes (sandbars, channels etc.). The broad pollen sampling interval and assessment nature of this study does not allow a detailed interpretation of the changing sedimentary environment.

Contrasting with many sites in London, the alluvial transgression over the old land surface was not characterised by an initial wave of alder carr woodland which developed as the soils became wetter. This transgressive phase was caused by rising relative sea level which caused ponding back of freshwater fluvial systems and ultimately brackish water inundation. Here, probably because of the altitude OD and also the historic age of the sediments, conditions became wetter which resulted in development of grass and sedge fen (with reeds etc) or wet floodplain. In column <65> this fen habitat appears to have become more mature in contexts (195) and (193) (from 2.28m upward).

With the very possible exception of high Chenopodiaceae (goosefoots and oraches) pollen values in the basal sample of <65> (262) there are no other indications of any marine/brackish saline influences. High values of Chenopodiaceae are frequently associated with salt marshes but may also, of course come from nitrogen rich, human and agricultural habitats.

Summary and Conclusions

The following key points taken from this study are:

Pollen was obtained from all of the samples examined. Pollen preservation is very variable with evidence of differential preservation in favour of some robust taxa (especially Lactucoideae) in column <66>.

Absolute pollen frequencies (numbers of pollen grains/ml) are what may be regarded as small.

The taphonomy of the pollen in these profiles was complex with fluvial and airborne transport and reworking of older pollen from older sediments.

Pollen assemblages obtained clearly show an open agricultural environment. This was both arable and pastoral although the latter may have been locally more important.

There was no woodland in the local region, either floodplain carr or on the interfluves.

It appears that as soil conditions became wetter in Phase 7, grass and sedge fen developed on site. This pertained throughout the period of sedimentation represented in these columns.

From the clear dominance of herbaceous habitats and the absence of woodland, it is suggested that these sediments are of historic age (Romano-British?) or probably later. This will be confirmed by radiocarbon dating.

5.10.2.4 Dating

Although some idea of the date of the deposits excavated has been inferred from their characteristics and level and very occasional dateable finds, 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. As a consequence, sub-samples were taken from the top and bottom of organic deposits in monolith tin samples for radiocarbon dating by Accelerator Mass Spectrometry (AMS), which was carried out by Beta Analytic, Florida. See Fig 6 for location of monolith tins.

Height m. OD (Context)	**MoLAS ref.**	**Lab no.**	**$^{13}C/^{12}C$ ratio**	**Uncalibrated date**	**Calibrated date 2 σ (95% probability)**
+2.06 (143)	OLY3.35/2.06	Beta - 250527	-28.1	4290±40	AD 130 to 340 (182 0 - 1610BP)
+1.72 (215)	OLY3.35/1.72	Beta - 252889	-27.1	5180 ± 35	410 to 360BC (2360 - 2310 BP) and 280 to 260BC (2230 - 2200 BP)

Table 10: AMS radiocarbon dates for Monolith sample <77>

The AMS results date the sediments sampled in Monolith sample <77>, toward the northern end of the trench, to have accumulated between the mid Iron Age and mid Roman periods.

Height m. OD (Context)	**MoLAS ref.**	**Lab no.**	**$^{13}C/^{12}C$ ratio**	**Uncalibrated date**	**Calibrated date 2 σ (95% probability)**
+2.56 (193)	OLY3.35/2.56	Beta - 250529	-27.1	6050 ± 40	AD 720 to 740 (1230 - 1210 BP) AD 770 to 970 (118 0 to 980BP)
+2.17 (196)	OLY3.35/2.17	Beta - 250528	-27.8	9450±40	AD 390 to 560 (1560 - 1390 BP)

Table 11: AMS radiocarbon dates for Monolith sample <65>

The AMS results date the sediments sampled in Monolith sample <65>, toward the southern end of the trench, to have accumulated between the late Roman/Early Saxon and the mid Saxon periods.

5.10.3 Synthesis of environmental and geoarchaeological results

The results of the different types of sedimentary, macrofossil, microfossil and radiocarbon analyses outlined above have been drawn together in this geoarchaeological summary with regards to Monolith sample sequences. See Fig 6 for location of monolith tins.

5.10.3.1 Monolith sample <65>

At the base of the monolith (from *c* 1.70m to 1.99m AOD) contexts [262] and [197], both silty clays with gravel and sands, are considered to represent a buried soil/prehistoric land surface (Period 2). Both the microfossil and macrofossil evidence

was limited but diatoms confirmed a freshwater depositional environment for [262] although ostracods recovered indicated periodic weathering and waterlogging possibly as pools across the surface of [262]. [197] dated with an Late Bronze Age sherd contained fragments of charcoal indicating burning (possibly anthropogenically induced) at the time of deposition. The pollen record showed these minerogenic alluvial sediments to be extremely variable in pollen numbers and preservation probably due to reworking of pollen eroded from interfluves, transported and re-deposited. In [262] and [197], this is manifested by the substantial numbers of Lactucoideae, a taxon which is frequently over represented in poor pollen preserving environments although, other less robust taxa (e.g. grasses) are, however, also present which attest to less severe modes of transport and deposition. In general however a picture of an open environment on a freshwater river floodplain begins to emerge.

Overlying [197], context [198], an iron stained gritty sand, returned considerable macrofossil information. It is suggested that during this Phase 3 (river encroachment) deposition occurred in a higher energy environment, allowing the entrainment and transportation of coarser grained sediments full of wood fragments and insects including water fleas and weevils. The amount of wood fragments and seeds found through plant macrofossil analysis seems to substantiate the idea of strand lines and other signs of active river encroachment as outlined in the site sequence section. The water fleas indicated a clear aquatic environment but the weevil species could also give the first indication in Monolith <65> of possible agricultural practices/human settlement locally as it is associated with herbivore dung and/or rotting vegetables. [198] also seems to be the first deposit perhaps to fill cut [239] in which the remains of the structure [159] was found. It has been suggested in this area was a retting pit but it may also be simply the remains of a revetment along the side of a minor, floodplain edge, subsidiary channel running parallel with the main channel to the north as seen in other trenches in the locality. Certainly the broad sands of [198] are typical of wider floodplain deposits which in this case seem to reach from the main channel to this feature where they end, possibly depicting the edge of the early floodplain.

The contexts relating to Period 5 (river migration) consist sequentially of [200], [199] and [196], all appearing as organic silty clay in monolith <65>, a period of relative quiescence where detrital strandline deposits accumulated intermittently. Contexts [200] and [199], only assessed for macrofossils, returned interesting plant material results. [200] was moderately rich in waterlogged seeds as well as possible straw. The waterlogged seeds occurring throughout both monoliths confirmed the dominance of wetland (aquatic and bankside/marshland) environments, and, notably, disturbed/waste ground habitats with little evidence for woodland/hedgerow species. The possible straw, however, again is indicative of local agricultural activity which is confirmed in [199] where charred cereal grains, notably wheat, and rachis (or spike to which the spikelets and grains of cereals are attached) detached through free-threshing of wheat were found. Context [196] was assessed for microfossils and radiocarbon dated. The diatoms were particularly rich and indicated a flowing fresh water environment. The broader ostracod analysis indicated the immature sediments in a higher energy riverine environment, with some fringing vegetation which equates with the phasing. The pollen still pictures an open environment but with the dominance of grasses. Notably the date places this context [196] in the very late

Roman/Early Saxon period which gives a *terminus ante quem* for the structure [159] buried beneath it.

The contexts relating to Period 6 (historic river channel – active phase) consist sequentially of [195], [194] and [193] and are the highest at between 2.63m and 2.23m AOD in monolith <65>. Context [195], which was assessed for macrofossils and microfossils, returned moderately rich plant and insect results continuing the theme of a wetland environment predominating. Notably, the insect material had shown signs of erosion or rotting which could be because of intermittent flooding and weathering similar to that involved in overbank depositional events as proposed in the phasing – conditions which possibly persisted through the accumulation of [194]. This works with the sedimentary interpretation as, although in this phase generally fining up, the sediments reflect probable flood events delivering coarser sands intermittently throughout. Context [193] was assessed for microfossils, macrofossils and radiocarbon dated. The radiocarbon date puts the accumulation of [193] into the mid Saxon period. The pollen assessment in particular indicated that both [193] and [195] supported a mature fen habitat and [193] had cereal pollen and herb species, meaning arable agriculture was taking place in the vicinity. With the earthworm capsules alongside water fleas found in the insect assessment, the lack of diatoms (probably through weathering), the mature fen and agriculture locally, the area was probably more stable and dryer than previous contexts indicate and, although still prone to flooding, less frequently inundated by this time.

5.10.3.2 Monolith Sample <77>

Context [215] (Period 2, buried soil/prehistoric landscape), at a maximum height of 1.86m AOD in the monolith tin sample <77>, was assessed for microfossils, macrofossils and radiocarbon dated. The poorly sorted nature of the gravels and sands in this clay deposit are considered to be due to post-depositional bioturbation processes. The radiocarbon date puts the accumulation of [215] into the mid Iron Age period which ties in closely with the Late Bronze Age/MIA finds found in associated contexts such as [262]. This is the earliest date returned for the trench as a whole, indicating sediments were deposited at the north end of the trench where the river, as assumed, was initially active and depositing sediments as it migrated southwards. Notably, these sediments were deposited over an earlier ditch cut [213] indicating this area was previously dry land earlier in prehistory. The diatoms and ostracods indicated a shallow freshwater environment, although occasionally stagnating, possibly in pools on the floodplain. The overall palynological characteristics of this whole monolith sample are similar to <65> with dominance of grasses, herbs, few trees and shrubs. Cereals feature throughout - again indicative of local agricultural activity. It is difficult to assess however whether [215] represented an early soil horizon at this time.

Context [143], [142] and [141] are all fills of the natural cut [209] which represents the southern edge of a NE-SW aligned river channel cutting into [215]. These contexts are grouped into Phase 6 (historic river channel – active phase) and range from 1.86m to 2.85m AOD. Both [141] an [143] were assessed through microfossil analysis but [143] was also radiocarbon dated and assessed for macrofossil material. The radiocarbon date puts the accumulation of [143] into the mid to late Roman period emphasising the hiatus between the deposition of [215] and its subsequent erosion and the deposition of [143]. The ostracod assessment again drew attention to

the immature nature of the silty clays in Period 6, indicating fairly continuous deposition, although the increasingly oxidised nature of these sediments reflect a lowering or at least a fluctuation in the water table at these levels. The rise and fall of the water table indicates that deposition occurred under conditions which permitted the wetting, and then drying and therefore oxidation of the sediments. This is likely to have occurred in a shallow water environment with a fluctuating water table, and is therefore consistent with the low energy environment envisaged in the phasing.

5.10.4 Non-monolith macrofossil data

Additional to those contexts associated directly with the monolith samples, three bulk samples were also examined for macrofossil data: [210], [217] and [192].

Context [210] was revealed within the southern sondage. It consisted of a loose mid grey poorly sorted sandy gravel and was considered to form part of the Early Holocene/prehsitoric floodplain (Period 1). Unfortunately there were only moderate amounts of identifiable remains in this context but all supporting the aquatic/marshland nature of the environment although it must be said that these macrofossils would have accumulated and mixed with these sediments as water levels rose as sediments at this level were deposited in the Pleistocene/Early Holocene.

Context [217] is located within the centre of the trench and is thought to represent the same deposit (Period 2) as [262] at the base of the sequence sampled in monolith sequence <65>. Interestingly the plant macrofossil analysis found charred cereal grains but also, curiously, a fig seed. As a result there is the strong suspicion that the macrofossil remains in [217] are at least partially intrusive.

Context [192], deposited in the final phase of alluviation (Period 7 – the pre-modern landscape) and consisted of soft greyish brown silty clay that represented a post medieval subsoil. This sample revealed moderate seeds and insects suggesting an aquatic input to the deposit still at this late stage, possibly during seasonal flooding events.

5.10.5 Summary

Overall the contexts assessed through sedimentary, macrofossil, microfossil and radiocarbon analyses have returned clear indications of the nature of the local environment. Insect and plant material recovered clearly portray an open, aquatic/marshland environment under the influence of a local freshwater river.

In general, a fining-upward sequence was identified in the stratigraphies of both monolith sequences with intermittent pulses of higher energy deposition, all of which seems to concur with the phasing.

Sediment deposition has been essentially due to flood events and a southerly river migration which subsumed earlier prehistoric features. Pollen data in particular pointed toward erosion from interfluves, transportation and re-deposition occurring onto the river floodplain.

Interestingly, the radiocarbon dates (along with the archaeological evidence) indicate these contexts were not deposited until late in the Holocene/pre-historic period, meaning the early Holocene/Pleistocene landscape would have remained unchanged for a considerable period of time.

Furthermore, the presence (and possible influence) of people seem to be concurrent with the accumulation of the deposits with arable agriculture taking place locally. The dates returned also indicate that the area began to stabilise or become a much lower energy environment really throughout the Saxon period when a more mature fen habitat develops across the site and water levels fluctuate.

5.11 Animal bone

Philip L. Armitage

5.11.1 Introduction

Nine bone specimens from five contexts were submitted for identification and assessment: [167], [201], [202], 205], [217].

5.11.2 Description

The overall state of preservation of these bones was assessed as poor to fair. Apart from two very small fragments of burnt/calcined bone (of indeterminate species/anatomy) from (217) all the specimens exhibited brown staining commonly encountered in animal bones associated with alluvial deposits.

Two species, both domesticated animals, were represented by the identifiable bone elements, which are listed below according to context:

Context [167] Period 5 (SG16), layer associated with river migration: 1 horse incisor; erupted but with no enamel wear, from a foal aged 6 to 10 months.

Context [201] (SG11), the fill of the SG10 ditch in Period 4 : 1 horse incisor; erupted but with no enamel wear, from a foal aged 6 to 10 months. [This tooth appears to derive from the same animal as the incisor from Context 167]. 1 horse upper cheek tooth; erupted but only just in wear, from a young individual.

Context 202 (SG11), the fill of the SG10 ditch in Period 4: 1 horse First phalanx; from an adult animal, both proximal and distal epiphyses fused; specimen is broken/abraded. 1 metatarsus; species indeterminate owing to poor preservation; horse/cattle sized

Context [205] (SG11), the fill of the SG10 ditch in Period 4: 1 cattle horn core attached to chopped piece of skull; left horn core/skull piece from an adult short horned cow.

Context [217] (SG02) Period 2: 2 “scrappy”/very small burnt/calcined fragments of animal bone of indeterminate species/anatomy. 1 unburnt unidentified animal bone fragment; pig/sheep/goat sized.

5.11.3 Potential

The animal bone assemblage on its own is far too small to merit publication.

It is recommended that they are included in the description of the other contemporary assemblages from relevant Olympic sites which require publication.

6 Potential of the data

6.1 Realisation of the original research aims

The research aims and objectives for the excavation were established in the *Written Scheme of Investigation For An Archaeological Excavation at Trench PDZ3.35* (MoLAS-PCA 2007b).

To identify evidence for settlement of prehistoric and historic date, particularly within zones of higher ground not already truncated by quarrying.

Prehistoric land surfaces (Late Bronze Age) were identified in Period 2. These were characterised as having been deposited in a freshwater environment. Charcoal indicated cultural activity.

Roman activity was identified in period 4 in the form of a ditch and its infill, and a possible retting pit: a feature that would take advantage of the wetland environment with its periodic inundation.

To identify wetland and channel margin activity of prehistoric date and riverside structures of historic date.

Although, beyond the above, no other riverside structures/features were identified, pre-Roman river channel scour activity was recorded (Period 3). Local agricultural activity may have taken place in Period 5.

Roman cultural activity in Period 4 was post-dated by inundation (Period 5). Local agricultural activity took place in Period 5.

Also identified crossing the excavation was a later north-east to south-west aligned river channel that was active from the mid-late Roman period to the late Roman to Mid Saxon period (Period 6).

To identify evidence for the nature and/or date of past land management and exploitation.

In the pre-modern period, there was evidence on the site for Roman exploitation (the Period 4 ditch and the possible retting pit. Otherwise, there was possible pre-Roman agriculture in a marginal environment and mid-late Roman period to the late Roman to Mid Saxon period agriculture in the vicinity.

To identify evidence for the nature and/or date of past waterways management and exploitation.

Although water courses did cross the site in Periods 3, 5 and 6 – no doubt as a result of periodic shifts in the water levels of surrounding floodplain – the only identified cultural feature that took advantage of this environment was the possible retting pit, of Roman date. The water courses themselves had not been managed.

A comparison of Fig 3, Fig 4 and Fig 5 shows that the Period 3 swale feature, the Period 4 ditch and the Period 6 river channel shared a north-east to south-east

alignment. This is significant as it shows the persistent effect of the underlying topography of the fluvial landscape in this area.

6.2 General discussion of potential

There is scope for further work to be carried out that will enable a fuller picture of the lower Lea Valley to be realised by contextualising the site in relation to the other Olympic archaeological interventions, defining and dating the activities in its landscape.

The finds recovered in the excavation date the archaeological features, but do not on their own contribute to the research potential of the site. They should be considered in relation to the Olympic site as a whole.

There is very good potential for further analysis of the environmental datasets (eg the straw-like stems in the Period 5 peat). Closer microfossil sampling and dating of key levels and deposits will allow closer resolution and linking to be achieved and should form the first stage of any further work. Further bulk sample analysis is recommended on certain key, productive deposits also.

Specific aspects of the site archive have potential to address key research questions based on themes that include:

- The chronological development of the site
- Land use
- Local economy
- The changing environment

6.2.1 Early Holocene/Prehistoric floodplain gravels (Period 1)

The early Holocene/prehsitoric floodplain was represented by SG01 in Period 1, with a surface level of between 1.84 to 1.70m OD. The area of the floodplain as revealed in the excavation is part of a wider early Holocene/prehsitoric landscape extending through the lower Lea Valley.

The excavation adds to understanding this aspect of the landscape, but is a snapshot of a small part of this landscape. Therefore the excavation has the potential to contribute to the understanding/reconstruction of the early Holocene/prehsitoric of the lower Lea Valley (Museum of London 2002, 78–9). As a baseline, the excavation has the potential to form part of a model used to develop an understanding of landscape formation (Museum of London 2002, 79).

6.2.2 Late Bronze Age buried soils/land surfaces (Period 2)

Alluvially deposited soils SG02 and SG03 were part of the same depositional event. Surface levels were between 1.80m to 1.95m OD. Radiocarbon dates were 410 to 360BC and 280 to 260BC, and burnt flint and Late Bronze Age pottery were recovered. Deposition occurred in variable conditions: there was evidence for freshwater, periodic weathering and waterlogging.

The above was sealed by land surface SG04 and SG05, another equivalent deposit, with a surface level of up to 2.08m OD. Environmental samples indicated an open environment on a freshwater river floodplain. Fragments of charcoal and Late Bronze Age-MIA pottery were recovered.

When contextualised against archaeological work undertaken elsewhere in the Olympic park, this evidence for a Late Bronze Age landscape has the potential to determine the extent of activity in the period (Museum of London 2002, 78–9). Again, as a baseline, the excavation has the potential to form part of a model used to develop an understanding of landscape formation (Museum of London 2002, 79).

6.2.3 River encroachment (Period 3)

Period 3 saw riverine encroachment and related deposition across the Period 2 surfaces. No datable material was recovered, but Period 3 was later than Period 2 (Late Bronze Age) and earlier than Period 4 (Roman)

A loose sand, SG06 and SG07, had a surface level of up to 2.28m OD. It had been deposited in a fairly high-energy environment, resulting from the encroachment of the river over the former dry land-surface: i.e. a riverine sand deposit. Environmental remains suggested an input of material from an aquatic environment into the deposit. Weevils may give the first indication of possible agricultural practices locally, as they are associated with herbivore dung and/or rotting vegetables.

A channel-like scour (a swale), SG08, cut across this sand. It had an alluvial fill; SG09.

The river encroachment has the potential to address the nature, extent and impact of differing hydrological regimes over different period of the lower Lea Valley, and how this may have determined or helped shape settlement patterns and communications. (Museum of London 2002, 78–9).

6.2.4 Roman activity (Period 4)

The Period 3 riverine deposits were cut into by two anthropogenic features of probable historic date: SG10, SG11, a ditch and fill; and structure SG12, SG13, S14, a possible retting pit.

The period 4 activities took place in a more stable land surface environment than previously present and offer the potential to improve understanding of agricultural and related practices in the area beyond the Roman City of London (Museum of London 2002, 41). There is also potential to address the relationship between the urban centre of Roman London, its hinterland, the supply of raw materials and related industries (Museum of London 2002, 43).

6.2.5 River migration (Period 5)

The Period 4 structure fell out of use during a period of river migration and related inundation, with SG15, a peat that included waterlogged seeds, possible straw, confirming the dominance of wetland (aquatic and bankside/marshland) environment and disturbed/waste ground habitats with little evidence for woodland/hedgerow species. The possible straw is indicative of local agricultural activity. This contrasted sharply with the earlier Period 3 high-energy depositional sequence (sandbar deposits)

and indicate a drastically reduced flow regime from previously. The most likely reason for this is the migration of the river channel, probably towards the north-west.

Contemporary deposits SG16 included Charred cereal grains, notably wheat, and rachis (or spike to which the spikelets and grains of cereals are attached) detached through free-threshing of wheat also confirmed agriculture. Pottery was redeposited.

As with Period 3, the river migration has the potential to address the nature, extent and impact of differing hydrological regimes over different period of the lower Lea Valley, and how this may have determined or helped shape settlement patterns and communications. (Museum of London 2002, 78–9).

6.2.6 Active river channel (Period 6)

The deposits in this period accumulated within the branch of a river (SG17), probably a meander that had migrated across the trench in historic time. This NE-SW aligned river channel that is believed to have represented the main artery of water flow (*thalweg*). Sediment formation was associated with the active channel phase, and represented a gradual accumulation of sediments within (SG18) and alongside (SG19) an increasingly inactive channel.

The AMS radiocarbon date puts the accumulation of SG18 in to the mid to late Roman period (AD 130 to 340).

Overbank deposition, SG19, was dated by AMS radiocarbon analysis to having accumulated between the very late Roman/Early Saxon period (AD 390 to 560) and the earlier part of the range AD 720 to 740 and AD 770 to 970.

Like period 3 and 5, the river activity has the potential to address the nature, extent and impact of differing hydrological regimes over different period of the lower Lea Valley, and how this may have determined or helped shape settlement patterns and communications. (Museum of London 2002, 78–9).

6.2.7 Pre-modern land surface (Period 7)

The Period 6 river channel and its related fills/deposits were sealed by the final phase of alluvial deposition SG20, which extended across the whole of the trench area. The surface of the deposit was between 3.16m to 2.93m OD. This represents post medieval subsoils/topsoils.

Period 7 offers the potential to understand the development of the site and its immediate landscape only.

6.2.8 Modern made ground and associated features (Period 8)

Two cuts and their fills had been excavated into the Period 7 subsoils/topsoils: SG21 and SG22. Made ground SG23 had been deposited over the cuts.

Period 7 offers the potential to understand the development of the site and its immediate landscape only.

7 Significance of the data

The excavation has added direct information to the archaeological understanding of the area. Sediment deposition has essentially been due to flood events and a southerly river migration which overlaid earlier prehistoric features, all of which concurs with the radiocarbon and finds dating, and phasing.

The sequence of alluvial sediments had within it dryland, river channels, backwaters, and marshy environments. Wet meadowland can also be identified. The changing environments across the floodplain area relate to river migration and overbank deposition. There was no evidence for medieval activity, and it is likely that much of the site was too waterlogged in medieval times for occupation, or to be effectively exploited in an archaeologically visible manner.

The environmental and geoarcheaological analyses have returned clear indications of the nature of the local environment. Insect, plant, pollen and diatom material recovered clearly portray an open, aquatic/marshland environment under the influence of a local freshwater river.

Furthermore, the presence of people seems to be concurrent with the accumulation of the deposits, with arable agriculture taking place. The dates returned also indicate that the area began to stabilise or become a much lower energy environment through time.

The archaeological remains are significant in two ways:

- they impose a time frame onto the sequence of environmental information
- the archaeological evidence indicates how marginal areas were used in specific periods

The excavation provided evidence indicative of prehistoric and historic river channels, the presence of a buried land surfaces and of Roman-era wetland exploitation.

The migrating historic meander identified represents a former course of the River Lea (or a possible forerunner to the Pudding Mill River) and is locally significant.

The evidence of site-specific Roman activity and local prehsitoric activity aids in the understanding of the past land use of the site and of the area in general. This evidence is of at least high local significance, if not regional.

This information will contribute to our understanding of the past environment of the site and its environs and will assist in landscape reconstruction models being developed. This information is certainly of local significance. When considered alongside the information currently being obtained from the other parts of the Olympic site, however, the geoarchaeological/environmental evidence undoubtedly has regional significance.

8 Recommendations

Although on its own the site merits publication, it is recommended instead the results of this excavation are assimilated into a site-wide assessment of all archaeological interventions of the Olympic site 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 existing on the site rests with the Local Planning Authority and their designated archaeological advisor.

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10 Bibliography

ACAO, 1993 *Model briefs and specifications for archaeological assessments and field evaluations*, Association of County Archaeological Officers

BADLG, 1986 *Code of Practice, British Archaeologists and Developers Liaison Group*

Battarbee, R.W. 1986. Diatom analysis. In: Berglund, B.E. (ed) *Handbook of Holocene Palaeoecology and Palaeohydrology*. John Wiley, Chichester, 527-570.

Battarbee, R.W., Jones, V.J., Flower, R.J., Cameron, N.G., Bennion, H.B., Carvalho, L. & Juggins, S. 2001. Diatoms. In (J.P. Smol and H.J.B. Birks eds.), *Tracking Environmental Change Using Lake Sediments Volume 3: Terrestrial,* Algal, and Siliceous Indicators, 155-202. Dordrecht: Kluwer Academic Publishers.

Beijerinck W. 1947, *Zadenatlas der Nederlansche Flora I-II.* Veenman and Zonen. Wageningen.

Bennett, K.D., Whittington, G. and Edwards, K.J. 1994 'Recent plant nomenclatural changes and pollen morphology in the British Isles'. *Quaternary Newsletter 73*,1-6

Beyens, L. & Denys, L. 1982. Problems in diatom analysis of deposits: allochthonous valves and fragmentation. *Geol. Mijnbouw 61*: 159-162.

Burrin, P.J. and Scaife, R.G. 1984 'Aspects of Holocene valley sedimentation and floodplain development in southern England'. *Proceedings of the Geologists' Association* 95,81-96.

Cameron, R A D; & Redfern, M, 1976 *British land snails* Linnean Society of London synopses of the British fauna no. 6

Clapham A., Tutin T., and Moore D. 1987, *Flora of the British Isles*. 3rd edition. Cambridge University Press.

Denys, L. 1992. A check list of the diatoms in the Holocene deposits of the Western Belgian Coastal Plain with a survey of their apparent ecological requirements: I. Introduction, ecological code and complete list. *Service Geologique de Belgique. Professional Paper No. 246*. pp. 41.

Department of the Environment, 1990 *Planning Policy Guidance 16, Archaeology and Planning*

Duff, A. (ed.) 2008. *Checklist of beetles of the British Isles*, 2008 edition. Privately printed, Wells: A. G. Duff.

Ellenberg H 1988, *Vegetation Ecology of Central Europe.* 4th Edition. Cambridge

English Heritage, 1991 *Exploring our Past. Strategies for the Archaeology of England*, English Heritage

English Heritage, 1991 *Management of Archaeological Projects (MAP2)*

English Heritage, 1997 *Sustaining the historic environment: new perspectives on the future*

English Heritage, May 1998 *Capital Archaeology. Strategies for sustaining the historic legacy of a world city*

English Heritage Greater London Archaeology Advisory Service, June 1998 *Archaeological Guidance Papers 1-5*

English Heritage Greater London Archaeology Advisory Service, May 1999 *Archaeological Guidance Papers 6*

Faegri, K. and Iversen, J. 1964 *Textbook of Pollen Analysis*. Blackwell Scientific Publications.

Faegri, K and Iversen, J. 1975. *Textbook of Pollen Analysis*. Blackwell Scientific Publications.

Faegri, K and Iversen, J. 1989 *Textbook of Pollen Analysis*. John Wiley and Son; Chichester.

Flower, R.J. 1993. Diatom preservation: experiments and observations on dissolution and breakage in modern and fossil material. *Hydrobiologia 269/270*: 473-484.

Hartley, B., H.G. Barber, J.R. Carter & P.A. Sims. 1996. *An Atlas of British Diatoms.* Biopress Limited. Bristol. pp. 601.

Hayward, P; Nelson-Smith, A; & Shields, C, 1996 S*eashore of Britain and Europe London*. HarperCollins.

Henderson, P A, 1990 Freshwater ostracods *Linnean Society of London synopses of the British fauna no. 42*

Hustedt, F. 1953. Die Systematik der Diatomeen in ihren Beziehungen zur Geologie und Okologie nebst einer Revision des Halobien-systems. *Sv. Bot. Tidskr.*, 47: 509-519.

Hustedt, F. 1957. Die Diatomeenflora des Fluss-systems der Weser im Gebiet der Hansestadt Bremen. *Ab. naturw. Ver. Bremen* 34, 181-440.

Institute of Field Archaeologists (IFA), 2001 *By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists (rev. 2001), Standard and guidance: excavation*

Institute of Field Archaeologists (IFA), supplement 2001, *By-Laws, Standards and Policy Statements of the Institute of Field Archaeologists: Standards and*

guidance – the collection, documentation conservation and research of archaeological materials

Jessop, L. 1986. Dung beetles and chafers. Coleoptera: Scarabaeoidea. *Handbooks for the identification of British insects 5* (11). London: Royal Entomological Society.

Kenward, H. K., Hall, A. R. and Jones, A. K. G. 1980. A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged archaeological deposits, *Science and Archaeology*, 22, 3-15.

Kenward, H.K., Engleman, C., Robertson, A. and Large, F. (1986). Rapid scanning of urban archaeological deposits for insect remains. *Circaea* 3, 163-172.

Killeen, I; Aldridge, D; & Oliver, G, 2004 *Freshwater bivalves of Britain and Ireland* Field Studies Council Occasional Publication 82

Krammer, K. & H. Lange-Bertalot, 1986-1991. *Bacillariophyceae.* Gustav Fisher Verlag, Stuttgart.

Luff, M. L. 2007. *The Carabidae (ground beetles) of Britain and Ireland. Handbooks for the identification of British insects 4 (2)* 2nd edition. London: Royal Entomological Society.

Macan, T T, 1977 *A key to the British fresh- and brackish-water gastropods* Freshwater Biological Association scientific publication no. 13

MoLAS-PCA. 2007a. *Lower Lea Valley Regeneration and Olympics Planning Delivery Zone 3. London Borough of Hackney. An Archaeological and Built Heritage Impact Assessment.* MoLAS-PCA. Unpublished Report

MoLAS-PCA. 2007b *Written Scheme Of Investigation Fior An Archaeological Excavation At Trench PDZ3.35 Planning Delivery Zone 3* MoLAS-PCA. Unpublished Report

MoLAS-PCA. 2008 *Work Package 2, Planning Delivery Zone 3, Trenches PDZ3.31, PDZ3.32, PDZ3.33, PDZ3.34, PDZ3.35, PDZ3.36, PDZ3.37, PDZ5.81(c), London Borough of Newham. A report on the evaluation* MoLAS-PCA. Unpublished Report

Moore, P.D. and Webb, J.A. 1978 *An illustrated guide to pollen analysis*. London: Hodder and Stoughton.

Moore, P.D., Webb, J.A. and Collinson, M.E. 1991 *Pollen analysis.* Second edition. Oxford: Blackwell Scientific.

Murray, J W, 1979 British nearshore foraminiferids *Linnean Society of London synopses of the British fauna* no. 16

Museum of London, 1994 *Archaeological Site Manual* 3rd edition

Museum of London, 2002 *A research framework for London archaeology*

Ryves, D. B., Juggins, S., Fritz, S. C. & Battarbee, R. W. 2001. Experimental diatom dissolution and the quantification of microfossil preservation in sediments. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 172, 99-113

Stace C. 2005, *New Flora of the British* Isles2nd Edition. Cambridge University Press.

Stockmarr, J. 1971 'Tablets with spores used in absolute pollen analysis'. *Pollen et Spores* 13,614-621.

Vos, P.C. & H. de Wolf 1988**.** Methodological aspects of palaeoecological diatom research in coastal areas of the Netherlands. *Geologie en Mijnbouw* 67: 31-40

11 NMR OASIS archaeological report form

OASIS ID: molas1-53726

Project details

Project name	Olympics Site - Planning Delivery Zone 3 Evaluation, Trench PDZ3.35 and 3.36
Short description of the project	Evaluation of trenches PDZ3.35 and PDZ 3.36 by MoLAS/PCA on the Marshgate Lane site within the Olympic, Paralympic and Legacy Transformations Planning Applications: Planning Delivery Zone 3 (Work Package 2) commissioned by the ODA. The earliest phase was floodplain gravel, possibly dating to the late Pleistocene period. This was overlain by a prehistoric land surface possibly of Late Bronze Age/early Iron Age date. Subsequent river encroachment indicates a period of increasingly wetter conditions and the deposition of high and low energy fluvial/alluvial sediments. Following this period of river advance at least two phases of human activity were recognized, first a fairly substantial ditch, the upper fills of which contained some Roman artefacts. A second phase of activity was the construction of a timber structure, which may represent a retting pit. Later disturbance was caused by a further phase of environmental change, resulting in the migration of a river channel, the active phase of which was recognized within the trench. Fluvial river deposits as well as overbank flood deposits characterised this active channel phase and a gradual sequence of higher energy deposition through to low energy silting and final abandonment was revealed. Sealing these deposits were the remains of a post medieval soil horizon and the beginning of a recent phase of deposition. This final phase consisted of successive layers of levelling and ground level raising deposits. Natural gravels were recorded between 1.7m to 1.84m OD and are possibly Late Pleistocene river gravels forming part of the Early Holocene/Prehistoric floodplain.
Project dates	Start: 17-10-2007 End: 26-10-2007
Previous/future work	Yes/Not known
Any associated project reference codes	OL-04307 - Sitecode
Type of project	Field evaluation
Site status	Local Authority Designated Archaeological Area

Current Land use	Industry and Commerce 1 - Industrial
Monument type	BURIED LAND SURFACE Late Bronze Age
Monument type	DITCH Roman
Monument type	RETTING POND Roman
Monument type	WATER CHANNEL Roman
Monument type	LAYER Roman
Monument type	LAYER Early Medieval
Monument type	BURIED LAND SURFACE Post Medieval
Monument type	LAYER Modern
Monument type	PIT Modern
Significant Finds	PLANT MICRO REMAINS Late Bronze Age
Significant Finds	POTTERY Late Bronze Age
Significant Finds	POTTERY Iron Age
Significant Finds	POTTERY Roman
Significant Finds	COIN Roman
Significant Finds	CERAMIC BUILDING MATERIAL Roman
Significant Finds	ECOFACT Roman
Significant Finds	WOOD Roman
Significant Finds	ECOFACTS Post Medieval
Significant Finds	GLASS Modern

Significant Finds	CERAMIC BUILDING MATERIAL Modern
Significant Finds	METAL Modern
Methods & techniques	'Targeted Trenches'
Development type	Public building (e.g. school, church, hospital, medical centre, law courts etc.)
Prompt	Direction from Local Planning Authority - PPG16
Position in the planning process	After full determination (eg. As a condition)

Project location

Country	England
Site location	GREATER LONDON NEWHAM STRATFORD Olympics Site - Planning Delivery Zone 3 Evaluation, Trench PDZ3.35 and 3.36
Postcode	E15
Study area	110.00 Square metres
Site coordinates	TQ 37463 83957 51.5372573873 -0.01773137083090 51 32 14 N 000 01 03 W Point
Height OD/Depth	Min: 1.70m Max: 1.84m

Project creators

Name of Organisation	MoLAS/PCA
Project brief originator	London Development Agency
Project design originator	MoLAS/PCA
Project	Kieron Tyler

director/manager	
Project supervisor	John Payne
Type of sponsor/funding body	Client
Name of sponsor/funding body	Olympic Delivery Agency

Project archives

Physical Archive recipient	LAARC
Physical Archive ID	OL-04307
Physical Contents	'Animal Bones','Ceramics','Environmental','Glass','Metal','Wood','other'
Digital Archive recipient	LAARC
Digital Archive ID	OL-04307
Digital Media available	'GIS','Images raster/digital photography','Spreadsheets','Survey','Text'
Paper Archive recipient	LAARC
Paper Archive ID	OL-04307
Paper Media available	'Context sheet','Drawing','Matrices','Photograph','Plan','Report','Section','Survey '

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	PLANNING DELIVERY ZONE 3, Trench PDZ3.35/36, A post-excavation

	assessment and updated project design
Author(s)/Editor(s)	Payne J
Date	2009
Issuer or publisher	MoLAS
Place of issue or publication	London
Description	Client Report - Post-Excavation Assessment report
Entered by	Pat Miller (pmiller@museumoflondon.org.uk)
Entered on	12 January 2009

12 Appendix 1: Context index

Context No.	Sub-group	Period	Type	Description	Section/Elevation
115	20	6	Layer	Possible early soil horizon	
139	20	7	Layer	Alluvial clay	S26
140	18	6	Layer	Alluvial clay, fill of [209]	S26
141	18	6	Layer	Alluvial clay, fill of [209]	S26
142	18	6	Layer	Fluvial clay and gravel mix, fill of [209]	S26
143	18	6	Layer	Fluvial clay and gravel mix, fill of [209]	S26
144	22	8	Fill	Fill of modern cut	S26
145	22	8	Cut	Large irregular cut	S26
146	23	8	Layer	Modern ground level raising deposit.	S27
147	23	8	Layer	Modern ground level raising deposit.	S27
148	23	8	Layer	Modern ground level raising deposit.	S27
149	23	8	Layer	Modern ground level raising deposit.	S27
150	23	8	Layer	Modern ground level raising deposit.	S27
151	23	8	Layer	Modern ground level raising deposit.	S27
152	23	8	Masonry	Modern ground level raising deposit.	S27
153	23	8	Layer	Modern ground level raising deposit.	S27
154	23	8	Layer	Modern ground level raising deposit.	S27
155	23	8	Layer	Modern ground level raising deposit.	S27
156	23	8	Layer	Modern ground level raising deposit.	S27
157	23	8	Layer	Modern ground level raising deposit.	S27
158	23	8	Layer	Modern ground level raising deposit.	S27
159	13	4	structure	Group number for timber within cut [239]	S30
160	20	7	Layer	Alluvial clay	S28 & 29
161	18	6	Layer	Alluvial clay, fill of [209]	S26,28 & 29
162	18	6	Layer	Alluvial/fluvial clay, fill of [209]	S28
163	19	6	Layer	Alluvial silty clay, thought to be part of bankside levee feature	S28 & 29

164	19	6	Layer	Alluvial silty clay, thought to be part of bankside levee feature	S28 & 29
165	19	6	Layer	Alluvial clay and gravel, thought to be part of bankside levee feature	S28 & 29
166	18	6	Layer	Alluvial clay	S28 & 29
167	16	5	Layer	Dark coarse silty sand, possibly sand bar.	S28
168	9	3	Layer	Alluvial/fluvial clay, fill of [264]	S28
169	6	3	Layer	Coarse sand, possible sand bar deposit	S28 & 29
170	19	6	Layer	Alluvial silty clay, thought to be part of bankside levee feature	S28
171	19	6	Layer	Alluvial silty clay, thought to be part of bankside levee feature	S28
172	4	2	Layer	Alluvial clay	S28
173	1	1	Layer	Sandy gravel	S28
174	1	1	Layer	Sandy gravel	S26
175	13	4	Timber	Post	plan 143
176	13	4	Timber	Post	plan 143
177	13	4	Timber	Post	plan 143
178	13	4	Wood	Horizontally lain wood, possible rod	plan 143
179	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
180	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
181	13	4	Wood	Horizontally lain wood, possible rod	plan 143
182	13	4	Wood	Horizontally lain wood, possible rod	plan 143
183	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
184	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
185	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
186	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
187	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
188	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
189	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
190	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
191	14	4	Wood	Lain wood, possibly destroyed structure	plan 143
192	20	7	Layer	Alluvial clayey silt, post medieval subsoil	S30
193	19	6	Layer	Alluvial silty clay	S30

194	19	6	Layer	Alluvial silty clay	S30
195	19	6	Layer	Alluvial clay	S30
196	19	6	Layer	Alluvial clay	S30
197	5	2	Layer	Alluvial clay	S30
198	7	3	Layer	Coarse sand, possible sand bar deposit	S30
199	15	5	Layer	Alluvial silty clay	S30
200	15	5	Layer	Peat deposit	S30
201	11	4	Fill	Coarse granular sand, fill of [213]	S28
202	11	4	Fill	Coarse sand and silt, fill of [213]	S28
203	11	4	Fill	Coarse to granular sand, fill of [213]	S28
204	11	4	Fill	Coarse sand and silt, fill of [213]	S28
205	11	4	Fill	Sandy silt, fill of [213]	S28
206	20	7	Layer	Land surface, pre ground level raising episode.	S30
207	19	6	Layer	Alluvial silty clay, thought to be part of bankside levee feature	S29
208	19	6	Layer	Alluvial silty clay, thought to be part of bankside levee feature	S29
209	17	6	Cut	Natural river channel cut	S28
210	1	1	Layer	Sandy gravel	S30
211	21	8	Cut	Modern truncation	S30
212	21	8	Fill	Fill of [211]	S30
213	10	4	Cut	Ditch cut	S26 & 28
214	11	4	Fill	Initial fill of [213]	S28
215	2	2	Layer	Possible early soil horizon	S28
216	N/A	N/A	Void context	N/A	N/A
217	2	2	Layer	Possible early soil horizon	Plan 217
218	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
219	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
220	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
221	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
222	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
223	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
224	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
225	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
226	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
227	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
228	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143

229	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
230	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
231	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
232	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
233	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
234	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
235	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
236	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
237	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
238	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
239	12	4	Cut	Shallow irregular cut	S30
240	15	5	Layer	Alluvial silty clay	S30
241	15	5	Fill	Fill of [239]	S30
242	12	4	Cut	Small shallow irregular cut	Plan 143
243	14	4	Wood	Lain wood, possibly destroyed structure	Plan 143
261	N/A	N/A	Void context	N/A	N/A
262	3	2	Layer	Possible early soil horizon	S25
263	15	5	Fill	Alluvial sandy clay, fill of [242]	Plan 143
264	8	3	Cut	Shallow irregular cut	S28
265	8	3	Cut	Shallow irregular cut	S30
266	9	3	Layer	Alluvial clay	S30

13 Appendix 2: Context index by period

Period	Sub-group	Context No.	Section/Elevation	Type	Description
1	1	173	S26	Layer	Alluvial clay
1	1	174	S26	Layer	Alluvial clay, fill of [209]
1	2	210	S26	Layer	Alluvial clay, fill of [209]
2	3	215	S26	Layer	Fluvial clay and gravel mix, fill of [209]
2	3	217	S26	Layer	Fluvial clay and gravel mix, fill of [209]
2	4	262	S26	Fill	Fill of modern cut
2	5	172	S26	Cut	Large irregular cut
2	6	197	S27	Layer	Modern ground level raising deposit.
3	7	169	S27	Layer	Modern ground level raising deposit.
3	8	198	S27	Layer	Modern ground level raising deposit.
3	9	264	S27	Layer	Modern ground level raising deposit.
3	9	265	S27	Layer	Modern ground level raising deposit.
3	10	168	S27	Layer	Modern ground level raising deposit.
3	10	266	S27	Masonry	Modern ground level raising deposit.
4	11	213	S27	Layer	Modern ground level raising deposit.
4	12	201	S27	Layer	Modern ground level raising deposit.
4	12	202	S27	Layer	Modern ground level raising deposit.
4	12	203	S27	Layer	Modern ground level raising deposit.
4	12	204	S27	Layer	Modern ground level raising deposit.
4	12	205	S27	Layer	Modern ground level raising deposit.
4	12	214	S30	structure	Group number for timber within cut [239]
4	13	239	S28 & 29	Layer	Alluvial clay
4	13	242	S26,28 & 29	Layer	Alluvial clay, fill of [209]
4	14	159	S28	Layer	Alluvial/fluvial clay, fill of [209]
4	14	175	S28 & 29	Layer	Alluvial silty clay, thought to be part of bankside levee

					feature
4	14	176	S28 & 29	Layer	Alluvial silty clay, thought to be part of bankside levee feature
4	14	177	S28 & 29	Layer	Alluvial clay and gravel, thought to be part of bankside levee feature
4	14	178	S28 & 29	Layer	Alluvial clay
4	14	181	S28	Layer	Dark coarse silty sand, possibly sand bar.
4	14	182	S28	Layer	Alluvial/fluvial clay, fill of [264]
4	15	179	S28 & 29	Layer	Coarse sand, possible sand bar deposit
4	15	180	S28	Layer	Alluvial silty clay, thought to be part of bankside levee feature
4	15	183	S28	Layer	Alluvial silty clay, thought to be part of bankside levee feature
4	15	184	S28	Layer	Alluvial clay
4	15	185	S28	Layer	Sandy gravel
4	15	186	S26	Layer	Sandy gravel
4	15	187	plan 143	Timber	Post
4	15	188	plan 143	Timber	Post
4	15	189	plan 143	Timber	Post
4	15	190	plan 143	Wood	Horizontally lain wood, possible rod
4	15	191	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	218	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	219	plan 143	Wood	Horizontally lain wood, possible rod
4	15	220	plan 143	Wood	Horizontally lain wood, possible rod
4	15	221	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	222	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	223	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	224	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	225	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	226	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	227	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	228	plan 143	Wood	Lain wood, possibly destroyed structure

4	15	229	plan 143	Wood	Lain wood, possibly destroyed structure
4	15	230	S30	Layer	Alluvial clayey silt, post medieval subsoil
4	15	231	S30	Layer	Alluvial silty clay
4	15	232	S30	Layer	Alluvial silty clay
4	15	233	S30	Layer	Alluvial clay
4	15	234	S30	Layer	Alluvial clay
4	15	235	S30	Layer	Alluvial clay
4	15	236	S30	Layer	Coarse sand, possible sand bar deposit
4	15	237	S30	Layer	Alluvial silty clay
4	15	238	S30	Layer	Peat deposit
4	15	243	S28	Fill	Coarse granular sand, fill of [213]
5	16	196	S28	Fill	Coarse sand and silt, fill of [213]
5	16	199	S28	Fill	Coarse to granular sand, fill of [213]
5	16	200	S28	Fill	Coarse sand and silt, fill of [213]
5	16	240	S28	Fill	Sandy silt, fill of [213]
5	16	241	S30	Layer	Land surface, pre ground level raising episode.
5	16	263	S29	Layer	Alluvial silty clay, thought to be part of bankside levee feature
5	17	167	S29	Layer	Alluvial silty clay, thought to be part of bankside levee feature
6	18	209	S28	Cut	Natural river channel cut
6	19	141	S30	Layer	Sandy gravel
6	19	142	S30	Cut	Modern truncation
6	19	143	S30	Fill	Fill of [211]
6	19	162	S26 & 28	Cut	Ditch cut
6	19	166	S28	Fill	Initial fill of [213]
6	20	115	N/A	Layer	Possible early soil horizon
6	20	163	S28	Layer	Possible early soil horizon
6	20	164	N/A	Void context	N/A
6	20	165	Plan 217	Layer	Possible early soil horizon
6	20	170	Plan 143	Wood	Lain wood, possibly destroyed structure
6	20	171	Plan 143	Wood	Lain wood, possibly destroyed structure
6	20	193	Plan 143	Wood	Lain wood, possibly destroyed structure
6	20	194	Plan 143	Wood	Lain wood, possibly destroyed structure
6	20	195	Plan 143	Wood	Lain wood, possibly destroyed structure
6	20	207	Plan 143	Wood	Lain wood, possibly destroyed structure

6	20	208	Plan 143	Wood	Lain wood, possibly destroyed structure
6	21	140	Plan 143	Wood	Lain wood, possibly destroyed structure
6	21	161	Plan 143	Wood	Lain wood, possibly destroyed structure
7	22	139	Plan 143	Wood	Lain wood, possibly destroyed structure
7	22	160	Plan 143	Wood	Lain wood, possibly destroyed structure
7	22	192	Plan 143	Wood	Lain wood, possibly destroyed structure
7	22	206	Plan 143	Wood	Lain wood, possibly destroyed structure
8	23	211	Plan 143	Wood	Lain wood, possibly destroyed structure
8	23	212	Plan 143	Wood	Lain wood, possibly destroyed structure
8	24	144	Plan 143	Wood	Lain wood, possibly destroyed structure
8	24	145	Plan 143	Wood	Lain wood, possibly destroyed structure
8	25	146	Plan 143	Wood	Lain wood, possibly destroyed structure
8	25	147	Plan 143	Wood	Lain wood, possibly destroyed structure
8	25	148	Plan 143	Wood	Lain wood, possibly destroyed structure
8	25	149	Plan 143	Wood	Lain wood, possibly destroyed structure
8	25	150	S30	Cut	Shallow irregular cut
8	25	151	S30	Layer	Alluvial silty clay
8	25	152	S30	Fill	Fill of [239]
8	25	153	Plan 143	Cut	Small shallow irregular cut
8	25	154	Plan 143	Wood	Lain wood, possibly destroyed structure
8	25	155	N/A	Void context	N/A
8	25	156	S25	Layer	Possible early soil horizon
8	25	157	Plan 143	Fill	Alluvial sandy clay, fill of [242]
8	25	158	S28	Cut	Shallow irregular cut
N/A	N/A	216	S30	Cut	Shallow irregular cut
N/A	N/A	261	S30	Layer	Alluvial clay

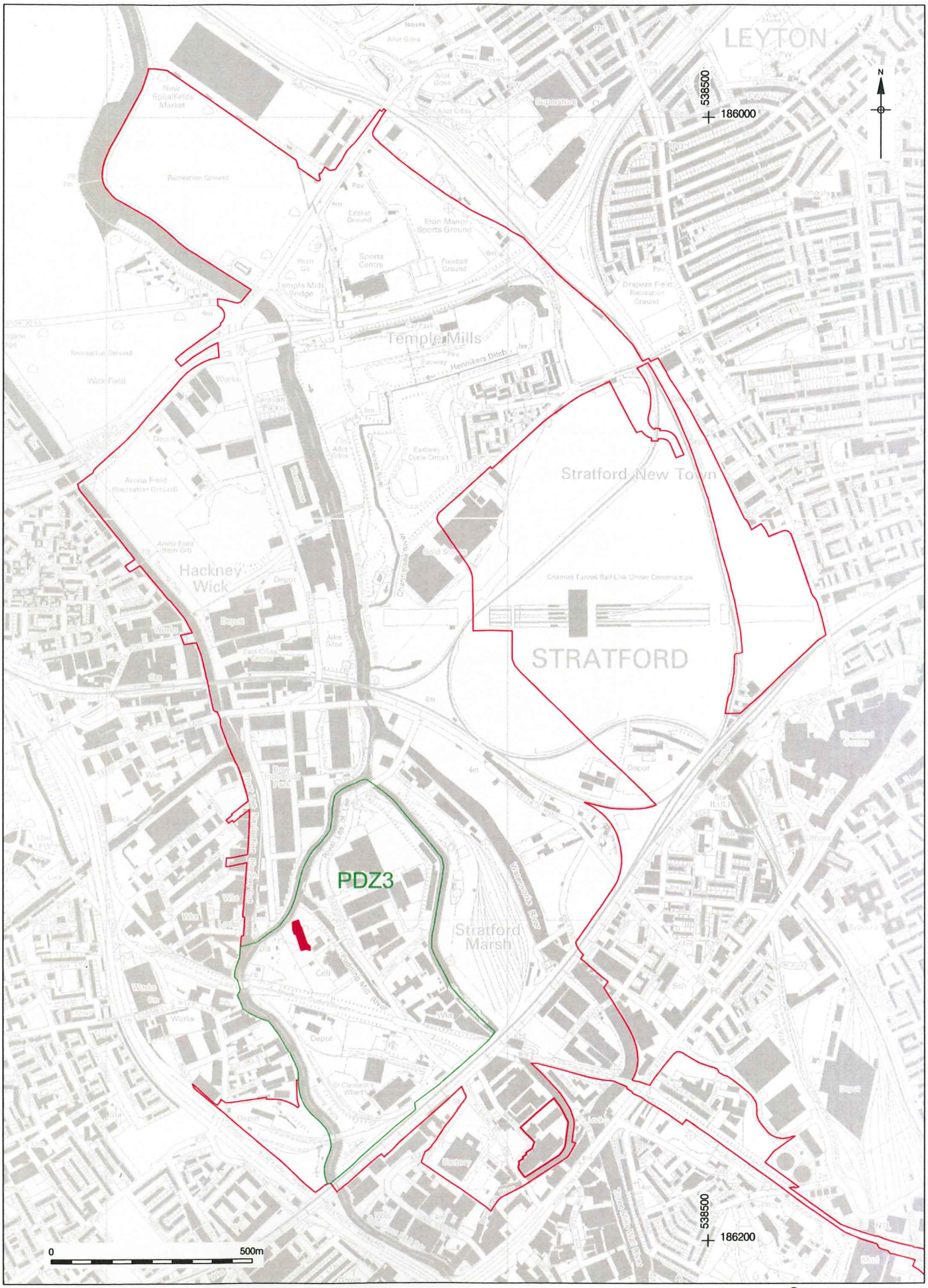


Figure 1
PDZ3.35/36 Site Location
1:12,500 at A4

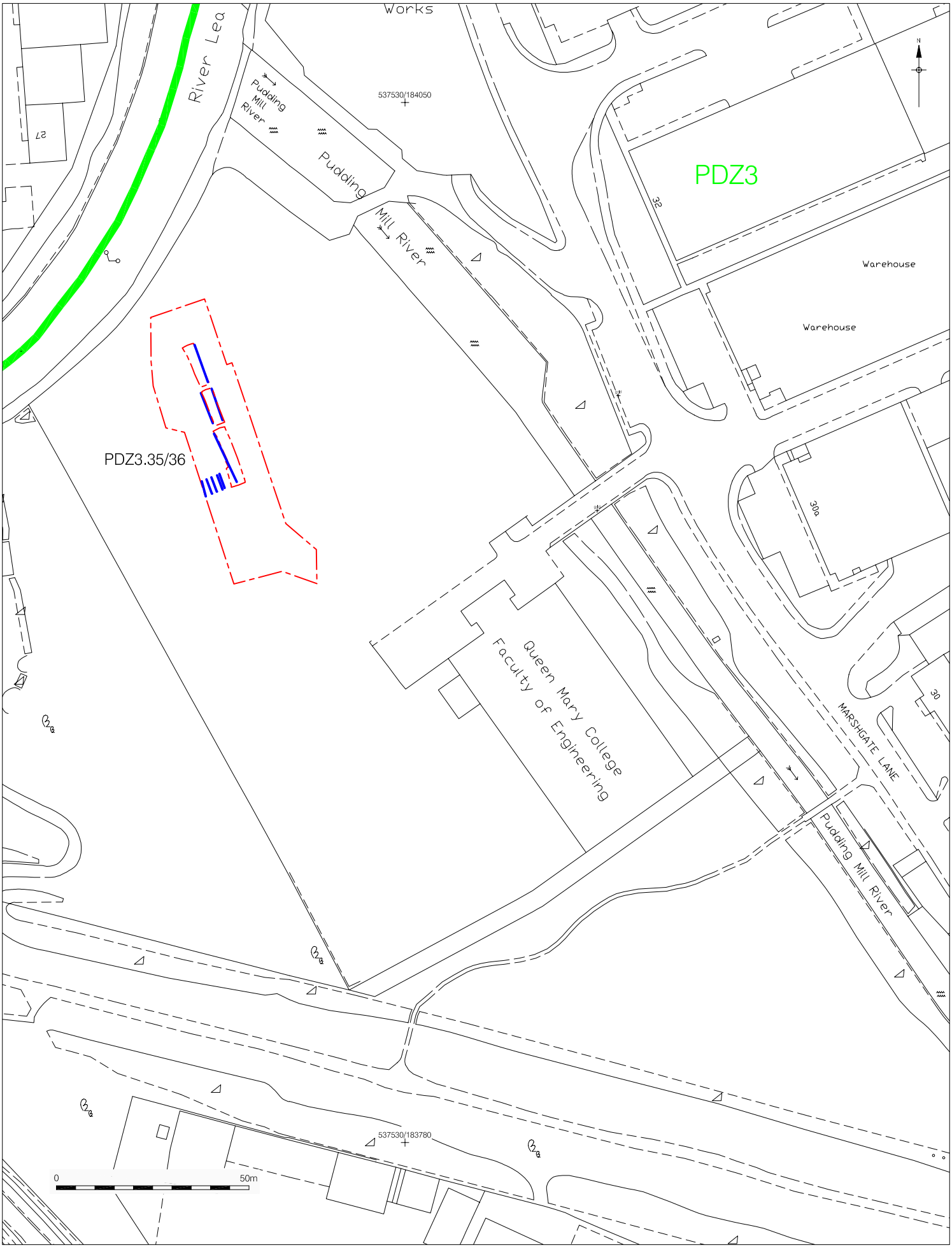
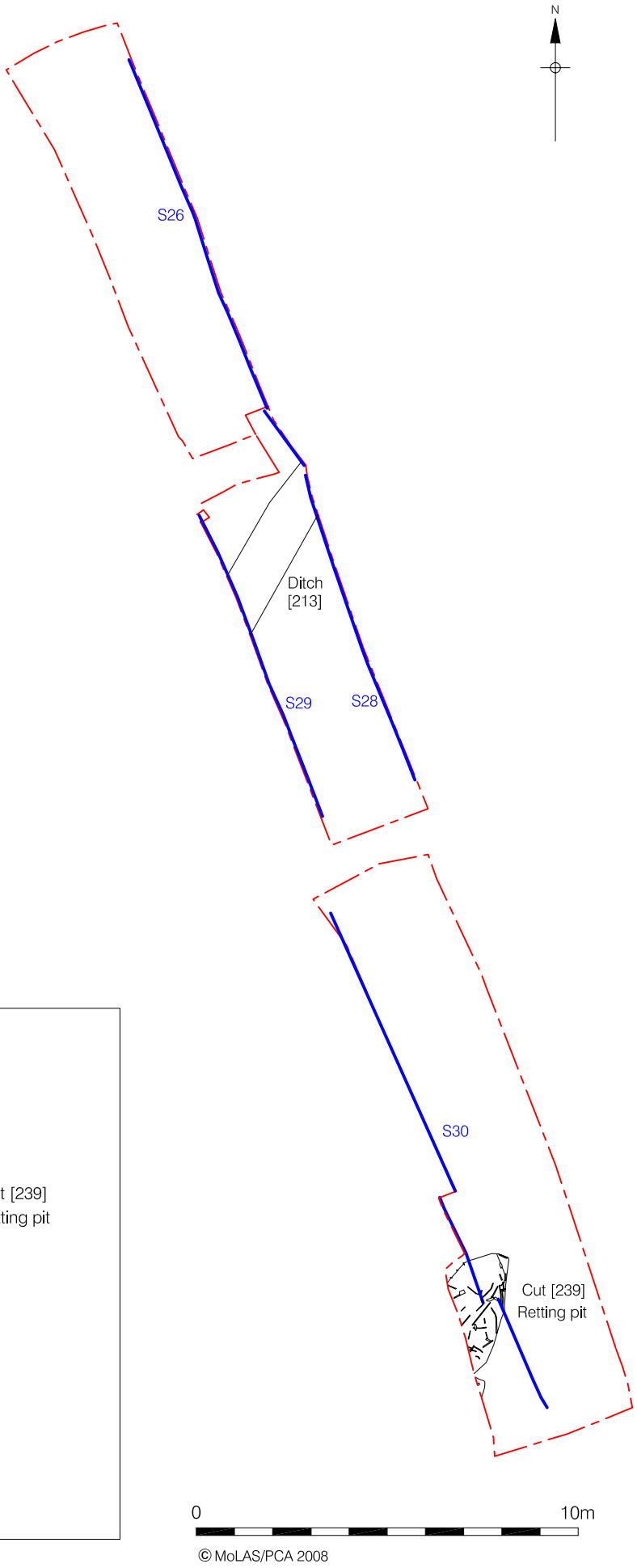
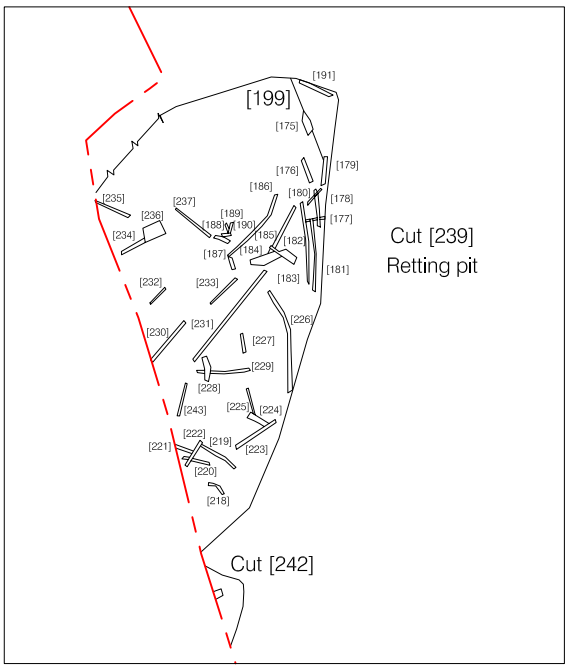


Figure 2
PDZ3.35/36 Trench location
1:1,250 at A4

Figure 3
Phase 2
1:160 at A4





Detail of retting pit: 1:50

Figure 4
Phase 4
1:160 at A4

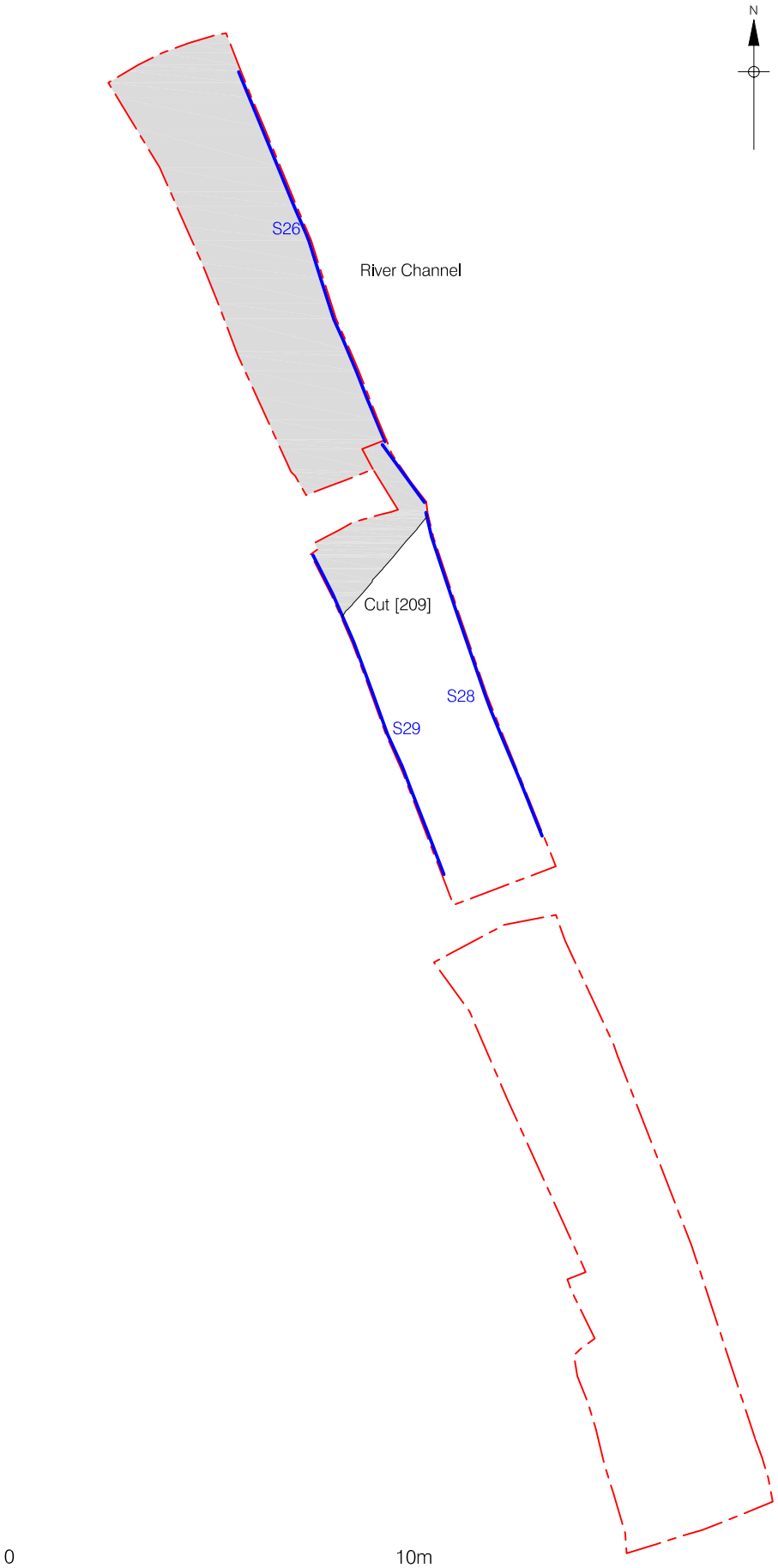
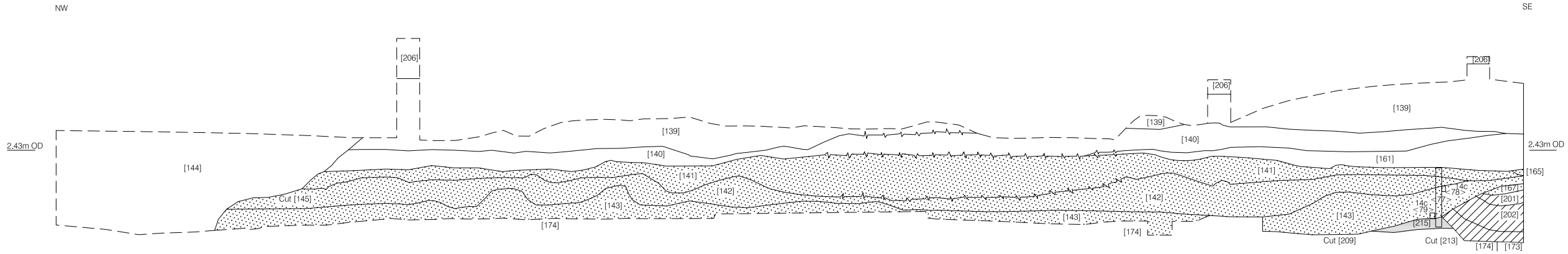
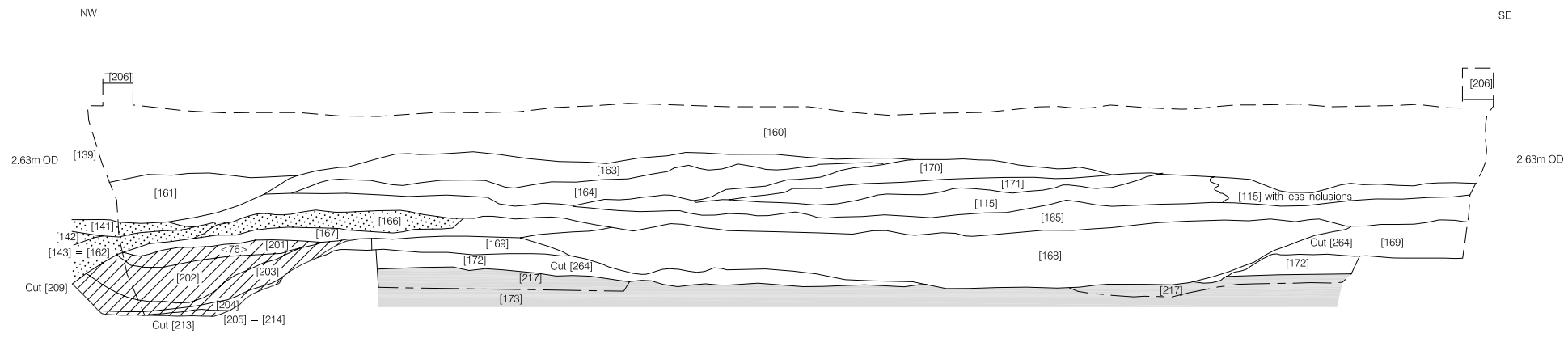


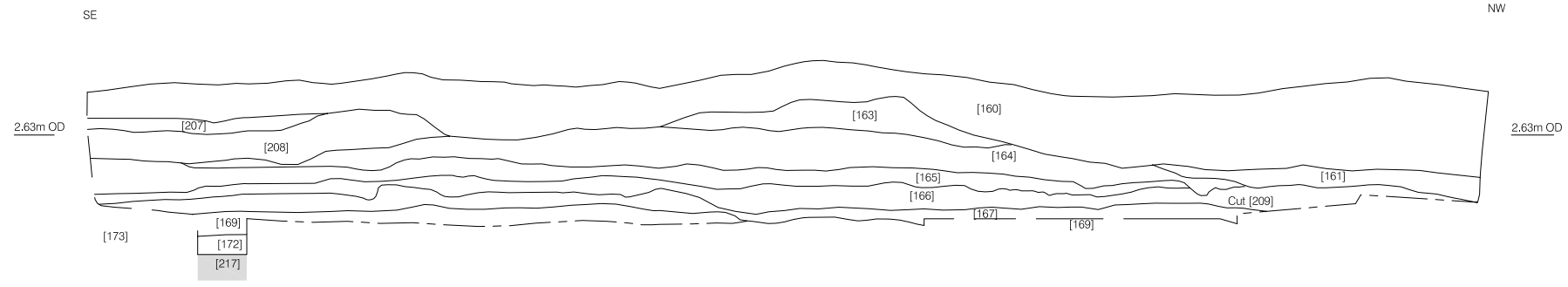
Figure 5
Phase 6
1:160 at A4



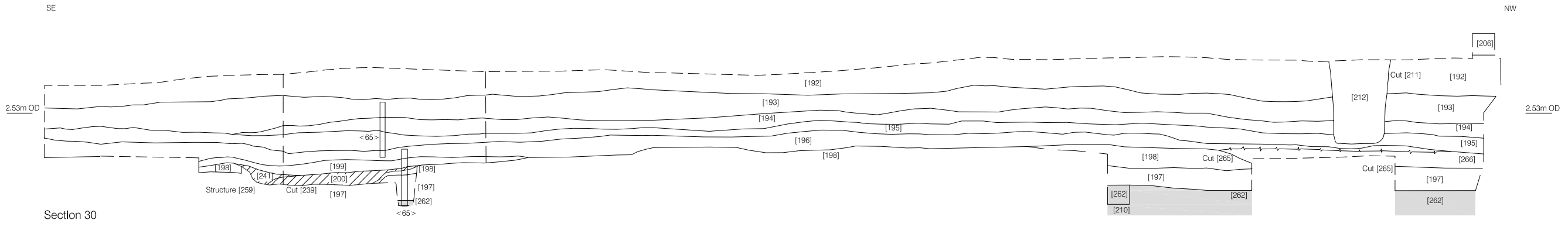
Section 26
PDZ 3.35/36 South east Facing



Section 28
PDZ 3.35/36 Southwest Facing



Section 29
PDZ 3.35/36 Northeast Facing



Section 30
PDZ 3.35/36 Northeast Facing

Phase 2 Phase 4 Phase 6

0 2m

Figure 6
Sections 26, 28, 29 and 30
1:40 at A3