HENNIKER'S DITCH
Construction Zone 6a
E15

London Borough of Newham

An archaeological evaluation report

REP-CSP-VA-06a-OLP-XXX-E-0790

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PRE-CONSTRUCT ARCHAEOLOGY

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E15

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Site Code: OL-00407
National Grid Reference: 537750 185300

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Summary (non-technical)

This report presents the results of an archaeological evaluation carried out by the Museum of London Archaeology Service and Pre-Construct Archaeology along the length of Henniker's Ditch in the London Borough of Newham. The report was commissioned from MoLAS-PCA by Capita Symonds on behalf of the Olympic Delivery Authority.

Following the recommendations of the Desk based assessment carried out for the Olympics and Paralympics and Legacy Transformations Planning Application Planning Delivery Zone 6 and the previous Construction Zone 6a which contains the site, a topographic and walkover survey was carried out, recording the present day extent and condition of the watercourse. Eight evaluation trenches were excavated within the site, across the course of Henniker's Ditch, to record past structures and phases within this historic water feature.

Archaeological deposits were seen to extend below the formation level of the proposed culvert. The earliest deposits recorded in the western three trenches were fluvial sands of uncertain date, which may belong to a former course of the Lea or one of its tributaries. It is possible that the sands belong to a variety of stream channels of different date. A landsurface had developed in the sands within two of the trenches, and fragments of daub were identified in the westernmost trench associated with the soil horizon. This suggests human activity in the vicinity at an early date. In contrast, evidence for a prehistoric or historic stream channel was identified in the third trench where fluvial sands were excavated. Peaty deposits infilling the abandoned channel have potential for past landscape reconstruction. The sands, landsurfaces and abandoned channel deposits in the western trenches were overlain by alluvial clay, representing prolonged flooding. This corresponds to, marshy meadowland across the site within the later historic period. Similar clayey deposits were not bottomed in the eastern five trenches. Between 0.60m and 1.1m of alluvial clay was recorded in each trench.

The earliest observed cutting of Henniker's Ditch cut through the alluvial clay and dated to the second half of the 18th century. The ditch gradually silted up, and may have been responsible for the formation of a relict pastoral topsoil that overlay the alluvium and the edges of the ditch. The ditch was re-cut in the second half of the 19th century; two possible tributary ditches adjoining the northern edge of the ditch were also recorded relative to this second phase. A third re-cut was also recorded. This last phase is associated with substantial amounts of made ground across the site laid down during the 1950s to 70s to create the existing Lea Valley Cycleway.

The geoarchaeological assessment of deposits from Trench 14 indicated that preservation is likely to be poor within most of the alluvial deposits. Although organic deposits with good potential for past landscape reconstruction were observed within what is probably an abandoned stream channel in Trench 11, the window of opportunity for sampling at low tide was insufficient to enable suitable samples for off-site work to be collected from this trench. However, molluscs were abundant in the alluvial clay in Trench 9, which lay closer to the active channels of the Lea.

The presence of earlier cuts of Henniker's Ditch, and the palaeoenvironmental sequence suggest that the Henniker's Ditch site has a moderate significance for understanding the natural and cultural formation and development of the lower Lea Valley.

It is considered that further fieldwork is unlikely to add any additional information to that obtained during the evaluation. However, the sequence of samples taken from the

fluvial sands, landsurface and overlying alluvial clay in Trench 9 and the monolith samples from Trench 14 have potential for contributing to current understanding of the past human environment of the Olympics Park.

It is recommended that a sample be submitted for radiocarbon dating from woody roots belonging to the landsurface in Trench 14 and that the samples taken from Trench 9 assessed to refine the research potential of the environmental micro (pollen and diatoms), and macro (snails and ostracods) remains they contain. The results should be summarised as an appendix to this document, to include a west–east transect comparing the deposit sequences in each trench and locating the samples within them and on the trench sections. The data and results should also be added to the archaeological GIS, so that they can feed in to any subsequent Olympics-wide assessment and updated project design for analysis. All other environmental samples from the Henniker's Ditch site should be discarded.

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1 Introduction

1.1 Site background

The evaluation took place along the course of Henniker's Ditch, which is located within the bounds of the former Eastway Cycle Circuit, approximately 1.4km north-north-west of Stratford town centre, hereafter called 'the site'. It is located within the Olympics and Paralympics and Legacy Transformations, in the northern part of Planning Delivery Zone 6 (PDZ 6) (also known as Construction Zone 6a (CZ6a)). The site is bounded by Clays Lane estate to the east and south; the northern part of the cycle circuit to the north and the north–south alignment of Henniker's Ditch to the west. The OS National Grid Ref. for centre of site is 537750 185300. Modern ground level immediately adjacent to the site lies at *c* 6m–9m OD. The site code is OL-00407.

A desk-top *Archaeological impact assessment* was previously prepared for Planning Delivery Zone 6, which covers the whole area of the site (MoLAS-PCA, 2007b). The *assessment* document should be referred to for information on the natural geology, archaeological and historical background of the site, and the initial interpretation of its archaeological potential. A Written Scheme of Investigation (WSI) was recently prepared for CZ6a (MoLAS-PCA 2007a) and forms the project design for the evaluation.

An archaeological field evaluation was subsequently carried out on a series of trial trenches placed at regular intervals spanning the watercourse, in April–May 2007. The evaluation addresses only part of the requirements of the WSI and that further evaluation in other parts of CZ6a remains to be completed.

1.2 Planning and legislative framework

The legislative and planning framework in which the archaeological exercise took place was summarised in the *Written Scheme of Investigation* (WSI) which formed the project design for the evaluation (MoLAS-PCA, 207a). The WSI itself draws upon the frameworks set forth in the *Environmental Statements* (ARUP 2003 & Capita Symonds 2004) covering all sites included in the Stratford City and Lower Lea Valley Olympic applications.

1.3 Planning background

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

The evaluation of Henniker's Ditch was undertaken in support of a condition proposed by English Heritage to be attached to any consent granted by the Olympic Delivery

Authority Planning Decisions Team with respect to Planning Application Number 06/90016/FUMODA. The proposed condition states:

> No works shall take place until the Applicants have secured the implementation of a programme of archaeological work in accordance with a written scheme for investigation which has been submitted by the applicant and approved in writing by the Local Planning Authority. The works shall only take place in accordance with the detailed scheme pursuant to this condition. The archaeological works shall be carried out by a suitably qualified investigating body acceptable to the Local Planning Authority.
>
> Reason: Significant archaeological remains may survive on the Site. The Planning Authority wishes to secure the provision of archaeological investigation and the subsequent recording of the remains prior to development, in accordance with the guidance and model condition set out in PPG16. This complies with policy EQ43 of Newham Unitary Development Plan and 4B.14 of the London Plan.

1.4 Origin and scope of the report

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

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

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

1.5 Aims and objectives

All research is undertaken within the priorities established in the Museum of London's *A research framework for London Archaeology*, 2002

The following research aims and objectives were established in the *Written Scheme of Investigation* for the evaluation (MoLAS-PCA 2007a Section 2), drawn from the *Desk Based Assessment* for CZ6 (MoLAS-PCA 2007b):

- Do Kempton Park Gravels exist in the extreme eastern part of the zone? What is the potential for past environment reconstruction from these deposits?
- Do deposits pre-dating the Last Glacial Maximum, which might correspond with the Arctic Beds, exist within or below non-reworked gravels in the eastern parts of the zone (Landscape Zone 1)? What is the potential for past environment reconstruction and/or Late Upper Palaeolithic activity in these deposits?

- What is the potential for dating (eg OSL or radiocarbon dating) the sandy clay/clayey sand deposit that lies above the gravels of the Low Terrace in the eastern part of the zone (Landscape Zone 1)? Can the depositional environment of these deposits be interpreted?
- Do Late Glacial deposits exist within re-worked gravels in the south-west part of the zone (Landscape Zone 3)? What is the potential for past environment reconstruction and/or Late Upper Palaeolithic activity in these deposits?
- Do slope deposits of Pleistocene and/or Holocene origin overlie Pleistocene gravel in the eastern part of the zone? What direct or indirect evidence of past human activity is associated with the colluvium?
- Did the Leyton River cross the zone in the Pleistocene or Holocene and is there evidence for human activity associated with the river?
- What environmental evidence suitable for past landscape reconstruction exists within deposits associated with ancient channels of the River Lea and its tributaries?
- Can episodes of channel activity and abandonment and wetland expansion across previously dry land surfaces on the zone be dated?
- Does evidence of prehistoric and historic occupation survive on the low terrace (Landscape Zone 1)?
- How extensive is modern truncation across the zone? Do made ground deposits bury or truncate the post medieval / modern land surface?
- What was the pre-modern / pre-Victorian topography of the zone?
- Is there any evidence of a Roman road and/or occupation activity within the area of the zone? If so, how does it relate to what is known of the settlement pattern further north in the Leyton area during the Roman period?
- Can surviving remains of the medieval and post-medieval mills at Temple Mills provide information on the nature of industrial activity in the Lea valley?
- Is there any evidence of medieval and post-medieval agricultural activity present on the zone? Is this associated with Chobham manor or Ruckholt manor and their later landholdings?
- Is there evidence for past water management, ie drainage ditches, mill remains, sluices and revetments associated with earlier courses of the Channelsea River/Henniker's Ditch and River Lea?

2 Topographical and historical background

2.1 Topography

The site is located on the eastern side of the floodplain (valley floor) of the River Lea, to the east of the Waterworks River. The modern topography and drainage of the area around the ditch has been much modified by human agency and bears little resemblance to the landscape of the site in historic and prehistoric times. The extent to which Henniker's Ditch and the nearby Channelsea River represent historic watercourses or canalised forms of older watercourses are not yet known. Both rivers are now controlled by sluices, and lie at the base of deep artificial canyons due to extensive ground raising in the area of the Eastway Cycle Circuit, which has masked the natural land surface beneath several metres of 'made ground'.

The site overlies alluvium, which represents a range of different wetland and dryland environments existing within the floodplain of the Lea from the Mesolithic period onwards. These deposits overlie the Lea Valley Gravels, the most recent of a series of Pleistocene river terrace deposits. The underlying London Clay forms a bottom line for deposits of archaeological interest, as its formation predates human evolution.

Three Landscape Zones were identified in previous Desk-Based assessment for CZ6: *Landscape Zone 1* to the east, in which Trenches 14-19 are located, comprises an area of higher ground, referred to as a low terrace, toward the valley side where the alluvium is thinnest; *Landscape Zone 2*, in which Trenches 9 and 11 are located, comprises an area of irregular topography in the northwest of the zone, possibly representing a network of river channels and islands. *Landscape Zone 3* comprises a low-lying area in the southwest of the zone characterised during the prehistoric period by a wetland environment crossed by river channels. No evaluation trenches were located within this last zone.

Henniker's Ditch may represent a canalisation of streams belonging to the Leyton River, which is thought originally to have flowed across the northern and western parts of CZ6, or the manipulation of other natural watercourses that previously drained the valley side and flowed across the floodplain. Stream deposits such as peat are thus a possibility, particularly in the western part of the ditch. In the east of the site the presence of such deposits would depend on the relationship of Henniker's Ditch to previous natural watercourses.

2.2 Prehistoric

Along the eastern stretch of Henniker's Ditch, were it crosses the low terrace there is potential for dryland occupation. Further west there is potential for archaeological remains of prehistoric date associated with higher, drier islands within the floodplain, perhaps relating to exploitation of the wetland environment and stream channels. Features may overlie or cut through the terrace gravels, whilst waterlogged ground conditions, associated with ancient stream channels, may have preserved later prehistoric organic remains of notable significance, such as wooden structures and

palaeoenvironmental material such as seeds, pollen and other environmental indicators.

2.3 Roman

The site is surrounded by known or possible Roman roads: the London to Colchester probably passed to the south; the London to Dunmow road probably ran west of the Waterworks River, crossing the Lea to the north of the site; and activity in Leyton suggests a road to the north-east. No Roman material has been found in the immediate vicinity of Henniker's Ditch. However, as with the prehistoric period, there may be evidence for activity associated with wetland exploitation, especially along the western stretch of the ditch and significant organic evidence may have been preserved by waterlogged conditions in this area.

2.4 Saxon

There is no evidence for early medieval activity in the immediate vicinity of Henniker's Ditch, although late Saxon bridge or jetty was recently recorded at the Stratford Box site to the south. Similar riverside structures may be found associated with former channels of the Lea and its tributaries, especially along the western stretch of the ditch. Dryland occupation on the low terrace may be less likely, as rising water levels are thought gradually to have increased the severity of flooding episodes from the beginning of this period. Again, waterlogged conditions may have preserved palaeobotanical evidence.

2.5 Medieval

The majority of the area around the site probably remained waterlogged during this period, perhaps exploited as pasture during the dryer months of the year. Henniker's Ditch may have originated during this period as a drainage ditch intended to improve the quality of the pasture. Earlier cuttings of the ditch are therefore a possibility, whilst waterlogged conditions may have preserved palaeobotanical evidence

2.6 Post-medieval

The name of Henniker's Ditch has its origins in the 18th century, as it is connected with a local landowner named John Henniker, who is depicted as having a residence to the south of the site adjacent to the Channelsea River in 18th century maps. By the 18th and 19th centuries it was certainly one of a series of drainage ditches running through the marsh immediately east of the Waterworks and Channelsea Rivers. During the 20th centuries many of these channels were culverted or backfilled and the river regime was also substantially altered, culminating in the present arrangement. Massive ground raising works were undertaken during the 1950s, -60s and -70s, with the Eastway Cycle Circuit being completed toward the end of this period.

3 The evaluation

3.1 Methodology

All archaeological excavation and monitoring during the evaluation was carried out MoLAS-PCA in accordance with the preceding *Written Scheme of Investigation* (MoLAS-PCA, 2007a), and the MoLAS *Archaeological Site Manual* (MoLAS, 1994).

An earthworks survey was carried out along the length of Henniker's Ditch using an EDM to capture the data. A walkover survey was also undertaken, producing detailed notes concerning the visible morphology of the ditch. Eight evaluation trenches were excavated across the Henniker's Ditch channel at regular intervals, extending into the 20th century made ground on either side.

Each trench was excavated to the formation level for the proposed concrete culvert, approximately 0.5m below the stream bed. At each trench location the stream was dammed with sandbags and the flow was 'over-pumped' around the excavation, with the water being reintroduced beyond a second temporary dam sufficiently downstream from the site works to avoid back-flooding. The trenches were excavated by a mechanical excavator using a flat bladed ditching bucket, supervised at all times by an archaeologist and banksman.

The locations of evaluation trenches were recorded by MoLAS-PCA surveying staff using an EDM. This information was then plotted onto the OS grid. Site levels recorded relevant to OS elevations were calculated from a benchmark attached to a station point located southwest of the eastern end of the ditch, on the opposite side of the cycleway.

A written and drawn record of all archaeological deposits encountered was made in accordance with the principles set out in the MoLAS site recording manual (MoLAS, 1994). MoLAS-PCA geoarchaeologists examined, interpreted and sampled the natural deposit sequence to evaluate formation of natural landscape and the site environment.

The site has produced: one trench location plan; 138 context records; eight trench plans at 1:20 scale; 10 section drawings at 1:10. The site finds and records can be found under the site code OL-00407 in the MoL archive (LAARC).

3.2 Results of the earthwork survey

3.2.1 Introduction

The walk-over survey of Henniker's Ditch, Potter's Ditch and the Channelsea River follows below. The earthwork plan resulting from the EDM survey of Henniker's Ditch is represented by Fig 2. The site of the watercourse has been split into its constituent parts as outlined.

3.2.2 Cartographic background to Henniker's Ditch

The earliest historic maps, dating to the eighteenth century (MoLAS-PCA 2007a), depict the Channelsea River following a north–south course from the east end of Potter's Ditch. The Waterworks River lies at the west end of Potter's Ditch, also flowing north–south. However, this arrangement was altered during the 20th century: a length of the Channelsea River immediately south of the east end of Potter's Ditch was infilled, channelling all flow westwards along Potter's Ditch, then south into the Waterworks River. Further south, the Waterworks River connected to the remaining stretch of the Channelsea River, then infilled south of this point. This has created the current layout, in which a length of the original Channelsea River (henceforth the 'northern stretch') survives between Henniker's Ditch and Potter's Ditch. Furthermore the waterway immediately south of the western end of Potter's Ditch is a remnant of the Waterworks River, which now connects seamlessly with the surviving stretch of the Channelsea River further south.

3.2.3 Henniker's Ditch

Henniker's Ditch has recently been culverted within a modern concrete embankment beneath the eastern end of the Lea Valley Cycleway. The ditch extends to the west of this culvert and comprises high-sided natural banking. Following the ditch westwards, the southern bank is occasionally punctuated by in-feed drainage pipes. A wood and iron footbridge spans the ditch towards its western end, beneath which the banking has been strengthened with stone-shaped concrete revetting. At the western end of the ditch the flow is channelled into two large modern concrete pipes beneath the cycle track embankment, after which it is directed southwards into the northern stretch of the original Channelsea River.

3.2.4 Northern stretch of the Channelsea River

The flow from Henniker's Ditch emerges from beneath the cycleway concrete embankment via a protruding outflow pipe, approximately 1m above the waterline. South of this the waterway is defined by natural soil banking along its eastern edge and steeper embanked made ground along its western edge. Towards its southern end, the eastern bank of the waterway is revetted behind horizontal timber planking held in place by solid vertical timber posts spaced at regular intervals. Approximately 0.30m above the waterline the horizontal planking gives way to vertical plank shuttering that extends into the water. At the southern end of the waterway the flow turns west into Potter's Ditch.

3.2.5 Potter's Ditch

The wooden revetting described above continues along the southern bank of the eastern half of Potter's Ditch. It is damaged and degraded in places, in particular the eastern end of the ditch. The vertical timber posts are tied into the bank by plates and tie beams. How far these tie beams extend into the bank, and what they are fastened to, could not be determined due to the presence of Japanese Knotweed, which is prolific in this area. At its western end Potter's Ditch connects with the northern end of the remaining stretch of the original Waterworks River, which flows southwards into the southern Channelsea River.

3.2.6 Southern stretch of the Channelsea River

This waterway is defined by steep, natural embankments. On the western side of the river a low-rising mudflat extends into the river course, often flooded at high tide. Along the southern half of its course the waterway bends, first to the west then to the east, resulting in an accumulation of debris forming a low bank on the western side that supports vegetation. Towards its southern end the waterway is crossed by a footbridge supported upon a modern iron grating with concrete surround, beyond which the riverbanks widen and the flow is less constrained. The banking at this point is formed of modern dumped deposits, creating soft landscaped banks down towards the river. The presence of the mudflats, and significant amounts of debris, precluded determination of whether any stone, timber or natural banking remained intact beneath or behind the made ground.

3.3 Results of the evaluation

For trench locations see Fig 3. Plan and section details of the trenches are presented in Fig 4 and Fig 5 respectively.

3.3.1 Evaluation Trench 9

Location	Towards western end of Henniker's Ditch
Dimensions	8.20m by 2.20m & 0.60m below ditch base
Modern ground level/top of slab	5.31m OD (track to south of ditch)
Base of modern fill/slab	3.05mOD
Depth of archaeological deposits seen	*c* 3m deep
Level of base of deposits observed and/or base of trench	Level of base of deposits observed 2.22m OD
Natural observed	2.50m OD

Mid orange assorted sub-angular gravely sand [115], was present in the trench base, sloping from 2.50m OD at the north-west limit of excavation to 2.28m OD at a distance of approximately 1m to the south-east. This was identified as river terrace gravel, possibly associated with late Pleistocene River Lea glacial gravels. The sandy gravel was overlain by pale grey gravely sand [114], with sub-angular gravel clasts measuring between 2mm and 10mm in size, and followed the underlying slope from a height of 2.63m OD in the north-west corner to 2.31m OD the southeast. The upper sand and gravel deposit may be identified with Pleistocene or early Holocene fluvial activity, possibly associated with earlier courses or channels of the Lea / Channelsea or Leyton Rivers. At the southern end of the trench this deposit was overlain by pale blue clay [113] at a maximum height of 2.55m OD. The clay contained large oxidised root channels and lumps of daub-like material and is likely to represent a buried landsurface. It was overlain by a pale orange clay [112] at a maximum height of 3.05m OD. This also contained iron staining, and both deposits represent gradual alluvial build up, probably through flooding across a floodplain. The difference in colour is most likely due to post-depositional drying.

A pale orangey brown silty clay [111], containing occasional small snail shells, overlay the deposits noted above at a height of 3.30m OD. This deposit may also

have been accreted through seasonal flooding, but was also subject to historic post depositional soil formation processes and weathering. It was overlain in turn by pale greyish brown silty clay [110], recorded at a maximum height of 3.50m OD within the limit of excavation but continuing upwards and southwards beyond it, and probably representing a horticultural topsoil horizon, possibly built up through the addition of nightsoil and other fine-grained household waste.

The above contexts, as exposed in the southern part of the trench were sampled with overlapping monoliths and bulk samples. Contexts [110] to [113] were cut by the southern side of Henniker's Ditch [106], aligned east–west where the base of the sequence lay at 2.29m OD. As mentioned above, the cut appears to respect gravel deposit [114], and gradually rises northward with it, continuing beyond the northern limit of excavation. The primary fill of this cut comprised dark grey clayey silt [105] containing moderate amounts of gravel (between 2mm and 10mm in size) and various 19th/ 20th century corroded iron and wood fragments. This deposit was recorded at 2.75m OD towards the north end of the trench, whilst to the south it had been reduced by a secondary cutting of Henniker's Ditch to a height of 2.50m OD.

The northern bank of Henniker's Ditch was formed from a series of made ground deposits overlying fill [105] at the north end of the trench. A layer of mid-brownish grey, sandy clay silt [109] containing small amounts of gravel, was recorded at 3.33m OD. This was overlain by a 0.3m thick layer of pale yellowish brown silty clay [108], in turn overlain by mid greyish brown sandy silt [107], present at 4.48m OD. This deposit, together with the three beneath it, had been truncated by a second cutting of Henniker's Ditch [104], referred to above, which descended almost vertically from 3.62m OD on the northern side of the ditch to 2.50m OD in the ditch base. It was partially filled at 2.88m OD by mid greyish brown sandy clayey silt [103], representing recent silting within the flow of the ditch.

3.3.2 Evaluation Trench 11

Location	Towards western end of Henniker's Ditch
Dimensions	6.10m by 2.20m & 0.50m below ditch base
Modern ground level	*c* 5.06m OD (road to east of ditch)
Base of modern fill	3.151m OD
Depth of archaeological deposits seen	1.1m deep
Level of base of deposits observed and/or base of trench	2.06m OD
Natural observed	N/A

Pale grey clayey sand [102], containing many small snail shells, lay at the base of the deposit sequence at the eastern end of the trench, at 2.15m OD. This represents a fluvial, channel-marginal deposit, associated with an earlier course or channel of the Lea / Channelsea or Leyton River and probably dates to the Holocene, though without further dating it is not possible to attribute either a prehistoric or historic date. The clay sand layer [102] was overlain by light to mid-greyish brown silty humic clay [101], at a height of 2.50m OD. This latter deposit contained occasional manganese staining and occasional organic content, chiefly comprising slivers of degraded wood, probably deposited within the confines of a muddy abandoned channel. It was overlain by pale blue clay [100] at a height of 2.62m OD, in turn overlain by pale orangey yellow clay [99] at a height of 3.15m OD.

The last two clay deposits represent gradual alluvial build up, probably through flooding across a floodplain. Post-depositional drying effects have caused the difference in hue between the deposits. Overlying these deposits was a layer of pale grey silty clay [98] at a height of 3.43m OD, which may also have accreted through seasonal flooding, but was also subject to soil formation processes. It was overlain by a horticultural topsoil horizon, comprising pale to mid brownish grey sandy clayey silt [97], recorded at a maximum height of 3.65m OD.

In the central-eastern portion of the trench, the silty clay deposit [101] was truncated by a north–south near-vertical cut [96]. Only a small portion of the eastern side of the cut was exposed within the trench, sloping slightly from 2.29m OD to 2.21m OD. The cut was filled with dark grey sandy clayey silt [95] containing corroded 19th/ 20th century iron fragments, present to a height of 2.62m OD. The layer extended across the western end of the trench, continuing beyond the limit of excavation. The cut may represent the initial eastern edge of Henniker's Ditch at the immediate vicinity. The western side was formed from layers of made ground overlying fill [95] at the western end of the trench. The made ground comprised an initial layer of pale orangey grey clay [94] at 2.72m OD, overlain by mid-greyish brown sandy clayey silt [93] at 3.10m OD. This was in turn overlain by mid to dark greyish brown sandy silt [92], at 4.02m OD. These deposits were truncated by a recutting [91] of the ditch, extending to the easternmost end of the trench, truncating the earlier ditch cut [96], down to 2.28m OD at its base.

The recut was filled with mid to dark greyish brown sandy clayey silt [90] to 2.82m OD and contained frequent gravel deposits and pieces of plastic bags. This was overlain by pale brownish grey clayey silt [89] at 3.10m OD and a minimum, mid-channel, height of 2.65m OD, representing recent silting within the flow of the ditch.

3.3.3 Evaluation Trench 14

Location	West-central section of Henniker's Ditch
Dimensions	8.2m by 2.20m & 0.60m below current ditch base.
Modern ground level	*c* 6.61m OD (road to south of ditch)
Base of modern fill	3.22m OD
Depth of archaeological deposits seen	1.00m
Level of base of deposits observed and/or base of trench	2.28m OD
Natural observed	N/A

A fluvial deposit [132] of Pleistocene or Holocene date comprising pale grey sand measuring c 0.3m in thickness lay at 2.52m OD. It was overlain by pale bluish yellow sandy clay [131] containing lenses of sandy gravel and woody roots, sloping slightly from a 2.77m OD at the northern end of the trench to a untruncated height of 2.64m OD at the southern end of the trench, where it was recorded as context [131]. This probably represents a transition between the underlying sand and the alluvial deposits above and appears to be associated with a buried landsurface. The woody roots may represent shrubby plant growth, perhaps within the final stages of waterlogging of the former landsurface, which may have lain within or at the surface of the overlying deposit [129], prior to the subsequent build-up of alluvial clay.

The lowest 0.35m of alluvial deposit [134] at the northern end of the trench had similar characteristics to [129], containing frequent sandy, gleyed root channels in a yellowish clay matrix, and it is likely that these two contexts are equivalent. The deposits may correspond to the initial flooding of the landsurface which was eventually buried by alluvial build up. The surface of this deposit dips slightly from *c* 3.10m OD in the north of the trench to 3.00m OD in the south. The overlying alluvium [134] comprised mottled bluish orange clay at the northern end of the trench, where it reached a maximum height of 3.42m OD and is equivalent to mid orange clay [128] seen in the south of the trench, recorded at a 3.22m OD.

The northern part of the trench, where the sequence of natural deposits was best preserved, was sampled by a geoarchaeologist with overlapping monolith tins and adjacent bulk samples through the alluvium and underlying sands. At the southern end of the trench alluvial deposit [128] was truncated by cut [127], aligned east–west and descended from 3.22m OD to a base at 2.69m OD where it was truncated by cut [125] (see below). This may represent the earliest phase of Henniker's Ditch. Its fill comprised mid orangey brown clay [126] with slight organic traces. The primary ditch fill was overlain by a layer of mid orangey grey silty clay [133], recorded at 3.87m OD, which may have formed through seasonal overbank flooding and erosion of the original sides of the ditch.

Mid orangey grey silty clay [135] was present at 3.93m OD at the northern end of the trench, overlying alluvial deposit [134]. Contexts [133] and [135] were weathered in appearance and disturbed by bioturbation and compacted by rooting. The deposit formed the subsoil to the pre-ditch landsurface. As mentioned above, ditch [127] and its fill [126] were truncated by a later recut of Henniker's Ditch [125]. The southern east–west edge of the recut was present at 3.25m OD sloping steeply down to a base at 2.35m OD. Its northern side incorporated the eastern half of a possible tributary ditch aligned north–south, thus giving the feature an apparent L-shape within the limits of excavation. The northern side rose to a maximum height of 3.93m OD. The recut [125] was filled with dark greyish brown silty clay [124] that sloped slightly from 3.66m OD near the sides to 2.72m OD mid-channel. This deposit contained moderate amounts of gravel and occasional 19th/20th century corroded metal fragments. On the north side of the ditch the fill was overlain by a secondary fill of dark greyish brown sandy clayey silt [123] at 3.97m OD, overlain in turn by pale to mid brown sandy silt [122] at 4.04m OD. This latter fill was overlain by a layer of dumped ground raising comprising mid greyish brown silty sand [118], at a height of 4.45m OD. The layer was partially truncated to the south by a third cutting of Henniker's Ditch [121], which extended to the southern limit of excavation, truncating deposit [133] at 3.87m OD. The base of the cut lay at 2.59m OD, and was filled with dark greyish brown silty clay [120] to 3.27m OD, which dropped slightly to 2.72m OD mid-channel. This was overlain by a secondary fill of dark grey sandy clayey silt [119] at a height of 3.17m OD dropping to 2.87m OD mid-channel. A final fill of mid greyish brown sandy silt [117] extended from 4.12m OD at the southern limit of excavation to a mid-channel level 2.94m OD. This represents recent deposition and silting within the flow of the ditch.

3.3.4 Evaluation Trench 15

Location	West-central section of Henniker's Ditch

Dimensions	6.40m by 2.20m & 0.40m below ditch base
Modern ground level	*c* 6.42m OD (road to south of ditch)
Base of modern fill	3.23m OD
Depth of archaeological deposits seen	0.80m deep
Level of base of deposits observed and/or base of trench	2.41m OD
Natural observed	N/A

A layer of pale greenish-grey clay [87] recorded at the southern end of the trench comprised the earliest deposit, at a height of 2.54m OD. This was overlain by pale yellowish-orange clay [86] at a height of 2.69m OD, overlain in turn by pale greyish yellow clay [85] at a height of 2.94m OD which contained slight organic content. Pale orangey yellow clay [84] overlay the earlier deposits at a height of 3.24m OD.

The latter three layers were matched by a near-identical sequence on the north side of the trench, comprising pale orange clay [83] at 2.68m OD, beneath pale greyish yellow clay [82] at 2.89m OD which also contained slight organic remnants, in turn overlain by pale orangey yellow clay [81] at 3.19m OD. All these deposits represent gradual alluvial build up, indicative of flooding.

The alluvial layers were truncated by the earliest cut [80] of Henniker's Ditch within the trench, the top of which was seen at 3.09m OD on its southern edge and 3.19m OD on its northern edge beyond the limit of excavation, and forming a channel approximately 4m wide. It was filled on its south side by pale greyish blue clay [79] at 2.68m OD, overlain by mid brownish grey clay [78] measuring 0.40m in thickness. The north side of the channel was filled by a near-identical sequence: a pale bluish grey silty clay [77] at 2.87m OD, overlain by pale brownish grey silty clay [76] at , 3.19m OD. These latter deposits were overlain by a layer of pale greyish brown silty clay [73] at a height of 3.34m OD, which may have accreted through overbank flooding and erosion of the channel edges. An identical deposit [74] overlay alluvial deposit [84] on the southern side of the ditch.

Fills [76] and [77] on the north side of the ditch were truncated to the south by a secondary cutting of Henniker's Ditch [88], the top of which was present at 3.14m OD sloping down to 2.59m OD. It was filled by mid to dark brownish grey silty clay [72]. This was overlain by a layer of made ground present at 4.36m OD, comprising mid greyish brown sandy silt [136] containing 20th century building material. An identical layer of made ground [70] was recorded on the southern side of the ditch, overlying deposit [74], at a maximum height of 4.19m OD within the limit of excavation but extending southwards and upwards beyond it. These two deposits were truncated by a third cutting of Henniker's Ditch [75], which dropped from 3.31m OD on its southern edge and 3.37m OD on its northern edge, continuing beyond the vertical limit of excavation at 2.54m OD, and forming a channel approximately 3m wide. It was filled with dark grey sandy clayey silt [71] at a mid-channel height of 2.76m OD, overlain by a secondary fill of mid greyish brown sandy clayey silt [137] at a mid-channel height of 2.89m OD. This deposit represents recent deposition and silting within the flow of the ditch.

3.3.5 Evaluation Trench 16

Location	Central section of Henniker's Ditch

Dimensions	6.80m by 2.20m & 0.50m below ditch base
Modern ground level	*Not established*
Base of modern fill	3.20m OD
Depth of archaeological deposits seen	*c* 0.90m
Level of base of deposits observed and/or base of trench	2.30m OD
Natural observed	N/A

Pale greenish grey clay [69], present at a height of 2.41m OD at the southern end of the trench, formed the base of the observed sequence. This was overlain by mid to dark greyish brown silty clay [68] containing organic inclusions at a height of 2.74m OD, overlain in turn by a layer of pale blue clay at a height of 2.93m OD. This was similarly overlain in turn by pale orangey grey clay [66] at a height of 3.20m OD. Deposits [68] and [66] were matched at the northern end of the trench by a layer of mid to dark greyish brown silty clay [65], overlain by pale orangey grey clay [64] at a height of 3.39m OD. These deposits represent gradual alluvial build up, probably through flooding. They were truncated by an east–west linear cut [62], descending from 3.20m OD on its southern edge and 3.23m OD on its northern edge beyond the vertical limit of excavation at 2.28m OD, forming a channel approximately 3.50m wide. This represented the earliest cutting of Henniker's Ditch as recorded within the trench. On its southern side the ditch was filled with mid greyish brown silty clay [61] at a height of 2.80m OD, overlain by a secondary fill of pale blue clay [60] at a height of 2.93m OD, in turn overlain by mid orange clay [59] at a height of 3.20m OD.

On its northern side the ditch was filled with pale to mid grey silty clay [58] at a height of 3.22m OD. On this side of the ditch alluvial deposit [64] was overlain by a layer of pale grey silty clay [63] at a height of 3.52m OD, which may have accreted through seasonal overbank flooding, but was also subject to soil formation processes. It was overlain by a horticultural topsoil layer of dark grey sandy silt [49] at a height of 3.91m OD. On the southern side of the ditch secondary fill [59] was sealed by a layer of pale grey silty clay [57] at a height of 3.48m OD, which again probably represents seasonal overbank flooding. This deposit was truncated to the north by a secondary cutting of Henniker's Ditch [56], present in the trench base at 2.3m OD. On the northern side of the ditch, cut [56] truncated fill [58], descending from a height of 3.07m OD beyond the vertical limit of excavation at 2.52m OD. On its southern side this new cut was filled by pale grey clay [55] at a maximum height of 2.99m OD, sealed by a secondary fill of dark grey sandy silty clay [54], present across the width of the cut to a maximum height of 2.79m OD. On the north side of the ditch this deposit was overlain by a fill of mid grey silty clay [53] at 3.06m OD. At the northern end of the trench, horticultural soil [49] was overlain by a layer of made ground comprising mid greyish brown sandy silt [48], at 4.32m OD. This layer continued upwards and northwards beyond the limits of the trench.

Deposit [48] was truncated to the south by a third cutting of Henniker's Ditch [52], which extended to the southern edge of fill deposit [54], and descended to 2.40m OD at its base. It was filled by dark grey sandy silt [51] containing moderate amounts of gravel, to 2.87m OD, overlain by a secondary fill of mid yellowish brown gravel [50] at 2.99m OD. This was overlain on the southern side of the ditch by mid greyish brown sandy silt [47], recorded at a maximum height of 3.76m OD within the

southern limit of excavation but extending upwards and southwards beyond it. This represents recent channel silting.

3.3.6 Evaluation Trench 17

Location	Central section of Henniker's Ditch
Dimensions	5.80m by 2.20m & 0.50m below ditch base
Modern ground level	Road level not recorded
Base of modern fill	3.52mOD
Depth of archaeological deposits seen	*c* 0.90m
Level of base of deposits observed and/or base of trench	2.60m OD
Natural observed	N/A

The earliest deposit comprised pale greyish yellow clay [34] at a height of 2.92m OD, in the southern end of the trench. This was overlain by pale orange clay [32] at a height of 3.51m, and pale blue clay [33] at a height of 3.10m OD, the difference in colour being due to post-depositional drying. At the northern end of the trench a similar deposit of pale yellow clay [43] was recorded at a height of 3.23m OD. All three deposits represent gradual alluvial build up, indicative of flooding. The latter deposit [43] was truncated to the south by a linear east–west cut [42], the top of which was recorded at 3.23m OD beyond the limit of excavation dropping to 2.74m OD at its lowest point. This represents the earliest cutting of Henniker's Ditch identified within the trench, and was filled with pale to mid grey brown clay [40] and mid grey clay [41], the difference in colour again being due to differential drying/weathering.

Deposit [40] contained an English, hard paste porcelain figurine of three children, dated to 1800 or later and a very small residual sherd of probable medieval South-Hertfordshire greyware (dated to 1170–1350). Deposits [40] and [41] were sealed by a layer of mid brownish grey clay [39] at a height of 3.33m OD, which contained a press-moulded clear glass bottle base with patent mark dated to 1820/50 or later. This deposit probably accreted through seasonal flooding, but was also subject to soil formation processes. A similar deposit [138] was recorded at the southern end of the trench, at a height of 3.92m OD.

Fill deposits [40] and [41] were truncated to the south by a secondary cutting of Henniker's Ditch [38]. The top of the ditch cut lay beyond the trench extent at a height of 3.27m OD dropping to 2.70m OD to the ditch base. It was filled by dark grey clay [37] at a height of 3.27m OD, which contained a press-moulded cylindrical green glass bottle dated to 1820/50 or later. This fill deposit was truncated by a gradually sloping cut, aligned north–south and was cut from a height of 3.33m OD at the western limit of excavation, dropping to 2.70m OD at the eastern limit of excavation. It was filled with dark grey sandy clayey silt [44] at a height of 2.90m OD, overlain by pale to mid greyish brown clayey sandy silt [36] at a maximum height of 4.00m OD, and may represent a tributary ditch or secondary drainage leat feeding into Henniker's Ditch. Its fill was overlain by a made ground deposit comprising pale yellow clay [35], recorded at a maximum height of 4.60m OD within the northern limit of excavation.

The fill of the tributary ditch was truncated to the south by a third cutting of Henniker's Ditch [31], which extended to the southern trench edge; the ditch cut was

present from 3.92m OD on its southern edge and 3.37m OD on its northern edge beyond the vertical limit of excavation at 2.60m OD. It was filled with pale greenish grey clay [30] at a mid-channel height of 2.75m OD, overlain by a secondary fill of dark grey sandy clayey silt [29] containing much gravel, at a mid-channel height of 2.92m OD, in turn overlain by a secondary fill of mid grey clay at the northern edge of the ditch, at a height of 3.37m OD, overlain by a final fill deposit of mid yellowish brown gravel [27] at a mid-channel height of 3.01m OD. The trench sequence was sealed by a layer of mid greyish brown sandy silt [26] at 3.08m OD

3.3.7 Evaluation Trench 18

Location	East-central section of Henniker's Ditch
Dimensions	7.60m by 2.20m & 0.50m below ditch base
Modern ground level	Road level not recorded
Base of modern fill	3.42m OD
Depth of archaeological deposits seen	*c* 0.90m
Level of base of deposits observed and/or base of trench	2.53m OD
Natural observed	N/A

The earliest recorded deposit comprised mottled pale yellow and greenish grey clay [46], and lay in the southern part of the trench at a height of 2.63m OD. This was overlain by pale greyish orange clay [25] at a height of 2.90m OD, overlain by pale to mid orange clay [24] at a height of 3.42m OD. These latter two deposits were matched at the northern end of the trench by an identical sequence, wherein deposit [25] was recorded at a height of 2.83m OD and deposit [24] at a height of 3.37m OD. These three deposits represent gradual alluvial build up, probably through flooding across a floodplain. The differences in colour represent post-depositional drying effects. The deposits were truncated by an east-west linear cut [23] descending from 3.42m OD on its southern edge and 3.37m OD on its northern edge and continuing beyond the vertical limit of excavation at 2.53m OD. This represents the earliest cut of Henniker's ditch. It was filled with mid greyish brown clay [22] at a maximum height of 2.91m OD, overlain by a secondary fill comprising pale greenish grey clay [21] at a maximum height of 3.09m OD, in turn overlain by a tertiary fill of pale greyish orange clay [20] at a maximum height of 3.43m OD. The colour differences are probably again due to post-depositional drying effects. On both sides of the ditch the tertiary fill was overlain by a layer of pale grey silty clay [19], which may have accreted through seasonal flooding, but was also subject to soil formation processes. This was truncated by a second cutting of Henniker's Ditch [18], extending across the length of the trench from a maximum recorded height of 3.76m OD on the southern limit of excavation and 3.61m OD on the northern limit of excavation, and continuing beyond the vertical limit of excavation at 2.55m OD. It was filled with dark grey sandy clayey silt [17] at a mid-channel height of 2.86m OD. At each end of the trench a layer of pale to mid brownish grey clayey silt [16] was recorded, at a height of 3.91m OD to the north and 4.18m OD to the south. These two parts were connected across the channel, no doubt by colluvial processes, at a mid channel height of 3.05m OD. On the northern side of the ditch deposit [16] was overlain by a further made ground deposit comprising mid greyish brown sandy silt [15] at a maximum

recorded height of 4.51m OD, but continuing upwards and northwards beyond this point.

3.3.8 Evaluation Trench 19

Location	Eastern end of Henniker's Ditch
Dimensions	7.0m by 2.20m & 0.30m below ditch base
Modern ground level	6.43m OD (road to south of ditch)
Base of modern fill	3.45mOD
Depth of archaeological deposits seen	0.60m deep
Level of base of deposits observed	2.83m OD
Natural observed	N/A

Mid orange clay [10] formed the earliest deposit at a height of 3.42m OD at the northern and pale grey clay [11] to the south of it at a height of 3.36m OD. These were matched by mid orange clay [13] at a height of 3.45m OD, and pale grey clay [14] to the north of it at a height of 2.97m OD at the southern end of the trench. These deposits represent gradual alluvial build up, probably through flooding across a floodplain. The differences in colour are related to differential post-depositional drying effects due to the presence of Henniker's Ditch.

Floodplain clay [14] was truncated to the north by the earliest cut of Henniker's Ditch within the trench, oriented east–west [8], itself severely truncated, the top of which survived to a height of 2.94m OD beyond the vertical limit of excavation. The ditch was filled with mid greyish brown silty clay [7] to 2.94m OD. Alluvial deposits [10] and [13] were overlain at either end of the trench by pale grey silty clay [9] at a height of 3.73m OD to the north, and [12] at a height of 3.57m OD to the south. These deposits may have accreted through seasonal flooding, but was also subject to soil formation processes.

A second phase of Henniker's Ditch [6] truncated the flood silts [9] and [12], from a height of 3.71m OD on its northern edge and 3.57m OD on its southern edge. The fill was a dark grey sandy clayey silt [5] at a mid-channel height of 2.95m OD, overlain by a secondary fill of mid yellowish brown gravel measuring *c* 0.10m thick. In the northern half of the ditch this latter fill was overlain by slumping from a made ground deposit present on the northern bank, comprising mid to dark greyish brown sandy silt [3]. In the middle of the channel this deposit was overlain by similar slumping [2] into the ditch from made ground on the southern bank, recorded at a maximum height of 3.99m OD. Modern made ground comprising mid greyish brown sandy silt [1] at 4.55m OD capped the sequence.

3.4 Geoarchaeological assessment

William Mills

3.4.1 Methodology

The objective was to describe, interpret, record and sample the stratigraphic sequence as observed in evaluation trench 9 and trench 14. The stratigraphic sequence was divided into separate sub-units depending on their individual characteristics. These were grouped into units of the same depositional conditions. The following discussion is from the base upwards. A small number of samples, representative of the main

deposit sequence excavated on the site were processed by MoLAS-PCA environmental specialists, in order to evaluate the general potential of these deposits for further off-site work. Processing involved floating *c* 5 litres of each sample for the recovery of plant remains, insects and charcoal and wet sieving a further 2 litres of sediment through a fine mesh (0.25mm) for the recovery of molluscs and ostracods.

The alluvial deposits of archaeological interest were not bottomed in the trenches, which extended down only to the new formation level of the culvert.

3.4.2 Results

Although Pleistocene gravels may have been reached in Trench 9, the provenance of this context ([115]) is uncertain and it may be of similar origin to the overlying fluvial sands [114] and the fluvial sands recorded in Trench 11 [102] and 14 [130], [131] and [132]. All these channel deposits are as yet of uncertain date and may belong to a former course of the Lea or one of its tributaries. It is possible that the sands in each of these trenches belong to different stream channels of different Late Pleistocene and Holocene date.

Woody roots extending through the fluvial sands in Trench 14 and oxidised root channels in Trench 9 are likely to relate to a soil / landsurface, which developed in the fluvial sands following their deposition and prior to the build up of the overlying alluvial clay. The soil / landsurface may also include the lowest clayey alluvial deposits ([113] and [129]). Fragments of possible daub were identified within this soil / landsurface in the westernmost trench (Trench 9), which suggest human activity in the vicinity.

In contrast, the shell-rich sands in Trench 11 may have been deposited at the margins of a prehistoric or historic stream channel and the overlying peaty humic clay deposits in this trench are likely to represent the mud accumulating as the abandoned channel infilled.

The sands, landsurface and abandoned channel deposits in the western trenches were overlain by alluvial clay ([112+111], [100-98], [128+134]), representing prolonged flooding, which may have been a seasonal occurrence in historic times, when the floodplain in this area was wet, marshy meadowland, as a result of rising river levels and the encroachment of estuarine conditions into this part of the Lower Lea. Similar clayey deposits were recorded in all five of the eastern trenches, where they were not bottomed.

The ditch was cut through the clayey alluvium and in several trenches the earliest cut appears to have been sealed by further alluvial clay, suggesting that despite the drainage ditch, flooding continued to take place.

Evidence for a topsoil, formed in the alluvial clay, with likely anthropogenic input (nightsoil and fine-grained household waste) and sealed by later dumping was also identified in several trenches.

Although the full sequence of natural deposits of archaeological interest was not seen in Trenches 15-19, the sequence observed in the excavated trenches corresponds with the predicted landscape model for CZ6, as discussed in the desk based assessment. Trenches 9 and11 appear to lie within an area of active stream channels, but dating is required to identify when these channels were active and when they became abandoned and vegetation took root in the former channel deposits or muddy

backwaters developed. The active channel deposits in Trench 14 may be of Pleistocene or Holocene date and the buried prehistoric landsurface predicted for the low terrace area of CZ1 may correspond with context [129] in Trench 14. However, the relationship between this landsurface and the landsurface identified at a slightly lower elevation in Trench 9 is not yet clear.

It does not appear that the ditch follows the course of an earlier, natural, stream channel. Instead it is likely that it was a man-made feature cutting across the low terrace. However, Trenches 15-19 were not dug deep enough to be certain whether any natural precursor of the ditch exists.

The environments represented by the alluvial clay along the line of the ditch, from Trench 9 in the west to Trench 19 in the east need clarification. A range of environments: from mudflats; through saltmarsh; to episodically flooded meadowland are likely to be represented and further work on the samples collected is needed to shed more light on this.

3.4.3 Preservation of environmental remains

Evaluation of environmental remains from the alluvial clays [134] and underlying landsurface [131] in Trench 14 indicated that preservation is likely to be poor within most of the alluvial clay excavated along Henniker's Ditch. Apart from a single buttercup and nettle seed, the only botanical remains preserved were occasional fine roots and flecks of charcoal. No insects, snails or ostracods were observed in any of the samples.

However, molluscs were abundant in the alluvial clay ([112)] in Trench 9, which probably lay closer to the active channels of the Lea than the trenches further east. It is possible that this deposit represents a different depositional environment. It is possible that examination of biological micro- and macro-fossils preserved within the alluvial clay will help to differentiate between floodplain soils, saltmarsh and intertidal mud, for example.

Frequent fibrous and woody roots in contexts [129] and [131] support the evidence from the on-site observations that a landsurface had developed at the base of the alluvial sequence in Trench 14. No seeds were preserved to provide any information about the characteristics of the vegetation growing on the landsurface. However, it is possible that pollen might be preserved in the monolith samples taken.

Although organic deposits with good potential for past landscape reconstruction were observed within what is probably an abandoned stream channel in CZ6.11, the window of opportunity for sampling at low tide was insufficient to enable a suitable sequence of samples for off-site work to be collected from this trench. However, Bulk samples {1} and {2} taken from the humic abandoned channel fill [101] is likely to have potential for preserving remains suitable for past landscape characterisation and dating.

The following table summarises the results of the evaluation of the deposits excavated for biological inclusions:

Table 1 Environmental evaluation of main deposits on the site Facies

Facies (site wide deposit)	Context	Sample number	Results	Notes
Ditch fills				Not sampled
Buried topsoil				Not sampled
Weathered alluvium	[134]	{14}	Virtually no organics, except rootlets and charcoal flecks; one nettle and one buttercup seed. <1ml flot. No snails or ostracods.	Sampled in monoliths {3} and {9} and also bulk {8}
Alluvium	[134]	{13}	Virtually no organics, except rootlets and charcoal flecks. <1ml flot. No snails or ostracods, in Tr14.	Sampled in monoliths {3} and {9}; also snail rich bulk {7} in Tr9
Abandoned channel fill				[101] sampled in bulks {1} and {2} in Tr11. Potential for radiocarbon dating, insects and plant remains.
Soil / landsurface developed in fluvial sands	[134]	{12}	30ml flot, virtually all rootlets; may confirm former landsurface at this level. No snails or ostracods.	Sampled in monoliths {3} and {9} and also bulks {6} & {5}, Tr9
	[131]	{11}	200ml flot; no identifiable seeds, virtually all fragmented wood (woody roots) and fibrous rootlets; may confirm former landsurface at this level. No snails or ostracods.	
Fluvial sands	[131]	{10}	500ml flot, 25% assessed; no identifiable seeds, virtually all fragmented wood (woody roots) and fibrous rootlets; may confirm former landsurface at this level. No snails or ostracods.	Sampled in monoliths {3} and {9} and bulk {1}
(?Pleistocene sand & gravel)				Not sampled

3.5 Stratigraphic discussion of the site

3.5.1 Active and abandoned channel deposits

The lowest sands and gravels recorded in Trenches 9, 11 and 14 ([132], [131], [130]; [102], [115], [114]) were deposited in active watercourses. Their date, characteristics and relationship, however, need further clarification. Reduced water flow, channel migration or abandonment led to soil / landsurface development ([113]; [129], 130]) in some of the active channel deposits, and a muddy backwater developing in Trench 11 ([101]). These processes may have taken place at any time from the Mesolithic onwards and dating is required to correlate the events between the trenches. The origin of the streams represented is also not yet clear, but might be better understood by examining the results of inputting the data into the geoarchaeological database/GIS for the Olympics Park.

3.5.2 Alluvial Clay

The deposits described above were overlain by alluvial clay in every trench. These deposits probably represent the continuous accumulation of sediment over several

millennia, or at least many centuries, through seasonal flooding. However, it is possible that in places the clay represents more permanent estuarine environments, such as mudflats and saltmarsh. Examination of microfossil assemblages from the clay might help to clarify their depositional environment.

The alluvium varied in thickness along the ditch from 0.60m to 1.10m, and its surface height from c 3.00m OD to 3.50m OD, with an average of approximately 3.30m OD. Occasional organic units were recorded within some of the sequences (for example [68] in Trench 16), which indicate marshy hollows existing from time to time across the floodplain. Unfortunately no dating evidence was located within the sequence that might suggest when the alluvial clay began to form. Its accumulation appears to have continued up to the time when Henniker's Ditch was first cut in the 18th century.

The uppermost part of the alluvial clay was stiff, more gravely, disturbed by roots and weathered (for example [98]). This is probably a post-depositional characteristic, resulting from the formation of a more stable landsurface following the embanking and manipulation of the Lea and its tributaries.

In several trenches an anthropogenic soil appears to have formed in the surface of the alluvium (for example [110]). This is probably a result of the deposition of nightsoil and other fine-grained domestic waste and its incorporation into the alluvial soil, perhaps by horticultural / market gardening activities.

3.5.3 Henniker's Ditch

Three distinct phases of Henniker's Ditch (here used to cover Henniker's Ditch proper, Potter's Ditch and the northern stretch of the original Channelsea River described above) were identified. The first, represented in Trenches 14 to 19, was cut through the alluvium described above. Although frequently truncated by later re-cuts, enough survived to show that the ditch had a U-shaped profile and was between 3.50m – 4m wide. The ditch base was never completely excavated, except in Trench 14 where it had been truncated by a later re-cut. Extrapolating from this re-cut and from the limits of excavation in other trenches gives an approximate base of 2.10 to 2.30m OD. Taking into account the height of the alluvium, the ditch may have had an original depth of just over 1m. This original ditch was filled with a sequence of alluvial clay layers, of which the primary deposit in Trench 17 contained a piece of porcelain dated to 1800 or later, suggesting that the ditch was excavated during the second half of the 18th century at the earliest. The edge of the cut was often sealed by a clayey deposit affected by soil formation processes, thought to represent overbank flooding, side erosion and the growth of vegetation along the edges of the ditch. In Trench 17 this deposit contained a piece of glass dated to 1820/50 or later. In some trenches the deposit was overlain by a relict topsoil horizon, which suggests the ditch was to some extent successful in draining the land to make it more suitable for pasture. This deposit was recorded at 3.91m OD (deposit [49] in Trench 16), but may well have continued higher beyond the limit of excavation, and thus adds another 0.50m to the depth of the ditch.

The second phase of Henniker's Ditch comprised a re-cut through the relict topsoil. This re-opened the channel to near its original width, but to a minimum recorded depth of 2.29m OD, which, due to the increase in ground level due to overbank flooding and soil formation, may represent a similar overall depth. Again, the ditch silted up, although this time the fills were more silty, and contained gravel and more

cultural material, perhaps implying more intensive exploitation of the surrounding pasture. The finds evidence suggests that the re-cut can be dated to the second half of the 19th century. In Trenches 9 and 11 this cut represents the first cut in the sequence. However, Trench 11 was positioned across the northern stretch of the original Channelsea River, and would be expected to produce evidence of earlier channels. The lack of such features suggests the channel may have drifted slightly eastwards. The same may be true of Potter's Ditch in Trench 9, which, although not as old as the Channelsea River, was nevertheless contemporary with Henniker's Ditch. This phase also includes two possible north-south tributary ditches recorded in Trenches 14 and 17, connecting with Henniker's Ditch on its northern edge. In Trench 14 the tributary cut was indistinguishable from the main ditch cut, whist in Trench 17 the tributary appears to have been cut slightly later than the main ditch cut.

The third phase of Henniker's Ditch is tied together with the ground-raising episodes of the 1950s–70s. In Trenches 9 and 11 this latest cut has again drifted southwards and eastwards respectively, whilst along Henniker's Ditch the cut continues the earlier alignments. Its height at base varies between 2.28m OD and 2.50m OD, but is on average 0.20m higher than the previous cut. The dating of this third phase is explicitly tied to the made ground formation in Trenches 9 and 11, where the deposits were dumped across the northern and western edges respectively of the earlier ditch before the later ditch was cut through them. This relationship is not so obvious along Henniker's Ditch, but can be observed to a lesser extent in a number of trenches. The remaining fills comprise recent silting and some colluvial deposition from the steep banks to either side.

3.6 Assessment of the evaluation

GLAAS guidelines (English Heritage, 1998) require an assessment of the success of the evaluation 'in order to illustrate what level of confidence can be placed on the information which will provide the basis of the mitigation strategy'. In the case of this site eight trenches were excavated to the formation level of the proposed concrete culvert. Evidence of previous ditch cuts was recorded, and the excavation exposed sufficient alluvial deposits to enable the characteristics of the Holocene landscape to be inferred. Possible Pleistocene deposits were only seen in Trenches 9 and 14. However, no dating has yet been undertaken and, as a result, the date range of the deposits excavated cannot yet confidently be assigned. The work undertaken satisfies the original requirements of the evaluation as stated in the Written Scheme of Investigation (MoLAS-PCA 2007b).

4 Archaeological potential

4.1 Realisation of original research aims

Do Kempton Park Gravels exist in the extreme eastern part of the zone? What is the potential for past environment reconstruction from these deposits?

Do deposits pre-dating the Last Glacial Maximum, which might correspond with the Arctic Beds, exist within or below non-reworked gravels in the eastern parts of the zone (Landscape Zone 1)? What is the potential for past environment reconstruction and/or Late Upper Palaeolithic activity in these deposits?

Pleistocene gravels were not exposed in Trenches 15–19 (the eastern part of the site) and so the nature of the gravels in this area remains unknown.

What is the potential for dating (eg OSL or radiocarbon dating) the sandy clay/clayey sand deposit that lies above the gravels of the Low Terrace in the eastern part of the zone (Landscape Zone 1)? Can the depositional environment of these deposits be interpreted?

This deposit may have been exposed in Trench 9: [114] and Trench 14: [131]. However in both cases it had been disturbed by subsequent weathering / soil formation and was unsuitable for obtaining suitable samples. Woody fragments deposited during their growth in the landsurface may, however, provide a terminus ante quem (taq) for the deposition.

Do Late Glacial deposits exist within re-worked gravels in the south-west part of the zone (Landscape Zone 3)? What is the potential for past environment reconstruction and/or Late Upper Palaeolithic activity in these deposits?

The trenches along Henniker's Ditch did not extend into this part of CZ6.

Do slope deposits of Pleistocene and/or Holocene origin overlie Pleistocene gravel in the eastern part of the zone? What direct or indirect evidence of past human activity is associated with the colluvium?

No slope deposits were exposed at the eastern end of Henniker's Ditch.

Did the Leyton River cross the zone in the Pleistocene or Holocene and is there evidence for human activity associated with the river?

Sandy deposits associated with fluvial activity were recorded towards the western end of Henniker's Ditch and at the northern stretch of the original Channelsea River and Potters Ditch. Their date, and whether these deposits relate to former channels of the Lea, or one of its tributaries, such as the Leyton River is not yet clear. This might be better understood following radiocarbon dating and examination of the data against the Olympics geoarchaeological database and GIS. No evidence of human activity associated with these deposits was found.

What environmental evidence suitable for past landscape reconstruction exists within deposits associated with ancient channels of the River Lea and its tributaries?

Monolith and bulk samples were taken from Trenches 9 and 14 and bulk samples from Trench 11, where monolith sampling proved impossible due to persistent presence of ground water across the trench base. Although few environmental remains survived in the alluvial deposit sequence in Trench 14, molluscs were frequent in the Trench 9 sequence and it is likely that microfossils will be preserved in the monolith samples from both Trench 9 and 14. Organic material suitable for radiocarbon dating has also been sampled in the fluvial, abandoned channel and buried landsurface parts of the Trenches 9, 11 and 14. There is good potential to obtain a better understanding of the former river channels crossing the western part of the site, especially if the results of the evaluation are assessed alongside the data obtained from the SI borehole monitoring.

Can episodes of channel activity and abandonment and wetland expansion across previously dry land surfaces be dated?

Samples have been taken for radiocarbon dating, which should be able to provide a date for former channel activity and abandonment in the western part of the Henniker's Ditch. Roots from shrubby tree growth likely to date immediately prior to, or roughly contemporary with, the wetland expansion across the former dry landsurfaces were sampled in Trenches 9 and 11.

Does evidence of prehistoric and historic occupation survive on the low terrace (Landscape Zone 1)?

No evidence of occupation was recorded within the alluvium of the low terrace; however the buried landsurface thought to exist on the low terrace not exposed.

How extensive is modern truncation across the zone? Do made ground deposits bury or truncate the post medieval / modern land surface?

Henniker's Ditch itself represents the only modern truncation recorded during the investigation. Significant amounts of made ground were deposited during the 1950s to 1970s.

What was the pre-modern / pre-Victorian topography of the zone?

Prior to 1950s–70s made ground the area was fairly flat, comprising the River Lea floodplain and associated channels to the west. Alluvium deposited throughout the Holocene was overlain by a relict topsoil that formed after the initial cutting of Henniker's Ditch. The ancient topsoil probably derived from less frequent overbank flooding and various soil formation processes associated with marshy pasture, as well as the deposition of anthropogenic material (such as nightsoil and fine-grained household waste).

Is there any evidence of a Roman road and/or occupation activity within the area of the zone? If so, how does it relate to what is known of the settlement pattern further north in the Leyton area during the Roman period?

No evidence of Roman activity was found.

Can surviving remains of the medieval and post-medieval mills at Temple Mills provide information on the nature of industrial activity in the Lea valley?

No evidence of medieval or post-medieval mills was found.

Is there any evidence of medieval and post-medieval agricultural activity present on the zone? Is this associated with Chobham manor or Ruckholt manor and their later landholdings?

Henniker's Ditch itself is evidence of post-medieval pastoral activity. No association can be drawn between the ditches as found and the nearby manors.

Is there evidence for past water management, ie drainage ditches, mill remains, sluices and revetments associated with earlier courses of the Channelsea River/Henniker's Ditch and River Lea?

Three distinct phases of cutting and re-cutting along Henniker's Ditch were discerned, beginning in the late 18th century. A second phase, dated to the second half of the 19th century, represents the earliest evidence of channels along the northern stretch of the original Channelsea River and Potters Ditch, suggesting that these have drifted eastwards and southwards respectively from their presumed original locations. The third phase represents the ditches as they are now, and was dated to the deposition of substantial made ground during the 1950s to 70s.

4.2 General discussion of potential

The evaluation has shown that earlier deposits, including the pre-modern ground surfaces, survive intact beneath late 19th century made ground. These comprise between 0.60m and 1.10m of Holocene alluvium, indicative of seasonally flooded marshy landsurfaces, not bottomed in the east between Trenches 15 and 19, but overlying active and abandoned channel deposits further west. Evidence relating to three distinct phases of cutting and re-cutting along Henniker's Ditch was also recorded, as was the associated formation of a pastoral or / and horticultural topsoil.

Further excavation is unlikely to reveal anything new concerning the evolution of Henniker's Ditch. However, evidence from channels of the Lea and/or its tributaries is preserved in Trenches 9, 11 and 14 and samples taken from these deposits have potential to reconstruct the past environment and river characteristics. The construction of the concrete culvert is unlikely to impact on the early Holocene and late Pleistocene levels, which are generally below formation level.

4.3 Significance

Very little is yet known about the evolving environment of the Lower Lea and its relationship to the changing landscape and river regime of the Thames and to the archaeology of the river terraces on either side of the valley floor.

Further analytical work on samples from the site would contribute to current understanding of the past environment of the site and its surroundings and would undoubtedly be of local significance. However, there is nothing to suggest that it would be of regional or national importance.

The evaluation of Henniker's Ditch has confirmed that evidence for Holocene channels might survive at the western end of Henniker's Ditch. Prehistoric landsurfaces exist within the area and might extend eastwards across the low terrace, although the trenches did not reach sufficient depth to confirm this.

In addition, the evaluation has confirmed that the phase of Henniker's Ditch examined here was originally excavated during the18th century. Earlier phases which may have been present in this area had been obliterated by the phase observed here.

5 Assessment by EH criteria

The recommendations of the GLAAS 1998 guidelines on *Evaluation reports* suggest that there should be:

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

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

In the following passages the potential archaeological survival described in the initial Assessment document and Section 3.2 above will be assessed against these criteria.

Criterion 1: period

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

Criterion 2: rarity

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

Criterion 3: documentation

There are no surviving documentary records for remains in the area from the Roman period. Whilst there may be considerable contemporary documentation for the later medieval period from c 1300 on, it is unlikely that any of this will be specific enough to relate to individual features.

Criterion 4: group value

None of the likely archaeological deposits are associated with contemporary single Monuments external to the site.

Criterion 5: survival/condition

The evaluation results above have demonstrated that archaeological remains survive mainly intact below present deposits of modern made ground. Vertical and lateral truncation is limited to the 20th century recutting and culverting of Henniker's Ditch and adjacent water channels.

Criterion 6: fragility

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

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

Criterion 7: diversity

Clearly, taken as a whole, the archaeological deposits which are likely to be found in the site represent a diverse and heterogeneous group of archaeological remains of all types and periods. However, this diversity is in itself the product of a random process of vertical and horizontal truncation and separation. There is no reason to suggest that the diversity per se has any particular value which ought to be protected.

Criterion 8: potential

(The term Potential in this context appears to mean that though the nature of the site, usually below-ground resources, cannot be specified precisely, it is possible to document reasons predicting its existence and importance). The evaluation has shown that pre-alluvial land surfaces survive in the vicinity, potentially dating to the Neolithic period. Such evidence would be of high local significance and moderate regional importance. Alluvial deposits also survive, although can only be broadly dated to within the Holocene era and are thus of limited potential and importance. Several phases of Henniker's Ditch exist in parallel to the present watercourse of that name dating to the 18th century. The earlier phases of the ditch are of moderate local importance.

6 Proposed development impact and recommendations

The proposed redevelopment involves construction of a concrete culvert along Henniker's Ditch to be subsequently buried beneath substantial deposits of made ground.

The impact of this on the surviving archaeological deposits will be to disturb and destroy all archaeological deposits within the footprint of the culvert, down to its formation level.

The evaluation has shown that evidence of earlier cuts of Henniker's Ditch survive to either side of the current ditch, as do Holocene alluvial floodplain deposits, overlying late Pleistocene/early Holocene sand and gravel deposits. All these deposits are of archaeological and palaeoenvironmental significance.

However, the evaluation should suffice as a record of the earlier cuts of Henniker's Ditch, and, in general, the palaeoenvironmental deposits of most interest at the bottom of the sequence should not be disturbed by the construction of the culvert.

The assessment above (Section 5) does not suggest that preservation *in situ* would be an appropriate mitigation strategy. It is therefore recommended that no further fieldwork work is needed along Henniker's Ditch, but that radiocarbon dating, microfossil assessment and assessment of the bulk samples from the humic clay [101] in Trench 11, and the snail rich fluvial and alluvial deposits in Trench 9 is undertaken. The potential of these samples for further work should be identified, the locations and results transferred to the archaeological Olympics GIS database and considered against their location with respect to the deposit modelling already undertaken in the area.

The decision on the appropriate archaeological response to the deposits existing on the site and analysis of samples rests with the Local Planning Authority and their designated archaeological advisor (English Heritage GLAAS).

7 Acknowledgements

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8 Bibliography

ARUP, 2003. Stratford City Environmental Statement, Volume 3, Archaeology

Cultural Heritage Committee of the Council of Europe, 2000 *Code of Good Practice On Archaeological Heritage in Urban Development Policies; adopted at the 15th plenary session in Strasbourg on 8-10 March 2000* (CC-PAT [99] 18 rev 3)

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

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

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

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

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*

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

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*

MoLAS-PCA. 2007a. Written Scheme of Investigation for an Archaeological Evaluation of Construction Zone 6a. MoLAS-PCA. Unpublished Report

MoLAS-PCA. 2007b. Lower Lea Valley Regeneration and Olympics Construction Zone 6. London Borough of Newham. An Archaeological and Built Heritage Impact Assessment. MoLAS-PCA. Unpublished Report

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

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

9 Appendix 1: Glossary

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

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

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

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

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

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

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

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

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

10 Appendix 2: NMR OASIS archaeological report form

OASIS ID: preconst1-27347

Project details

Project name	Henniker's Ditch
Short description of the project	Eight evaluation trenches were excavated across Henniker's Ditch along its length and the results have helped to refine the initial assessment of its archaeological potential. The trenches were excavated to the formation level of the proposed culvert. The earliest deposits recorded were Late Pleistocene river terrace gravel associated with the River Lea, overlain by early Holocene fluvial sand and gravel, both sloping gradually to the southeast. The latter deposit was thought to relate to a possible earlier course of the Channelsea or Leyton Rivers, possibly located to the southeast of the western end of the ditch. These deposits were overlain by between 0.60m and 1.1m of alluvium, thought to have accumulated gradually over time due to seasonal flooding. The earliest recorded cutting of Henniker's Ditch was cut through this deposit, dated to the second half of the 18th century. The ditch gradually silted up, but was also perhaps responsible for the formation of a relict pastoral topsoil recorded overlying the alluvium and the edges of the ditch. The ditch was re-cut in the second half of the 19th century; two possible tributary ditches adjoining the northern edge of the ditch were also recorded relating to this phase. A third re-cut was associated with the deposition of substantial amounts of made ground across the site during the 1950s to 70s to create the existing Lea Valley Cycleway.
Project dates	Start: 26-04-2007 End: 03-05-2007
Previous/future work	No / No
Any associated project reference codes	OL-01407 - Sitecode
Type of project	Field evaluation
Site status	Local Authority Designated Archaeological Area
Current Land use	Other 14 - Recreational usage
Monument type	DRAINAGE DITCH Post Medieval
Methods & techniques	'Targeted Trenches'
Development type	Olympic and Paralympic Games
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 Henniker's Ditch
Postcode	E15
Study area	2000.00 Square metres

Site coordinates	TQ 3775 8530 51.5492568166 -0.01306960477220 51 32 57 N 000 00 47 W Point
Height OD	Min: 2.15m Max: 2.63m

Project creators

Name of Organisation	MoLAS/PCA Ltd
Project brief originator	English Heritage
Project design originator	Gary Brown
Project director/manager	Gary Brown
Project supervisor	Andrew Sargent
Type of sponsor/funding body	Olympic Delivery Authority

Project archives

Physical Archive recipient	LAARC
Physical Contents	'Ceramics',' Environmental'
Digital Archive Exists?	No
Digital Contents	'none'
Paper Archive recipient	LAARC
Paper Contents	'none'
Paper Media available	'Context sheet',' Matrices', 'Photograph', 'Plan',' Report',' Section', Survey '

Project bibliography 1

Publication type	Grey literature (unpublished document/manuscript)
Title	Henniker's Ditch, Construction Zone 6a, London Borough of Newham. A report on the evaluation
Author(s)/Editor(s)	Sargent, A.
Date	2007
Issuer or publisher	MoLAS/PCA
Place of issue or publication	London
Description	A4 bound report
Entered by	Andrew Sargent (asargent@pre-construct.com)
Entered on	4 June 2007

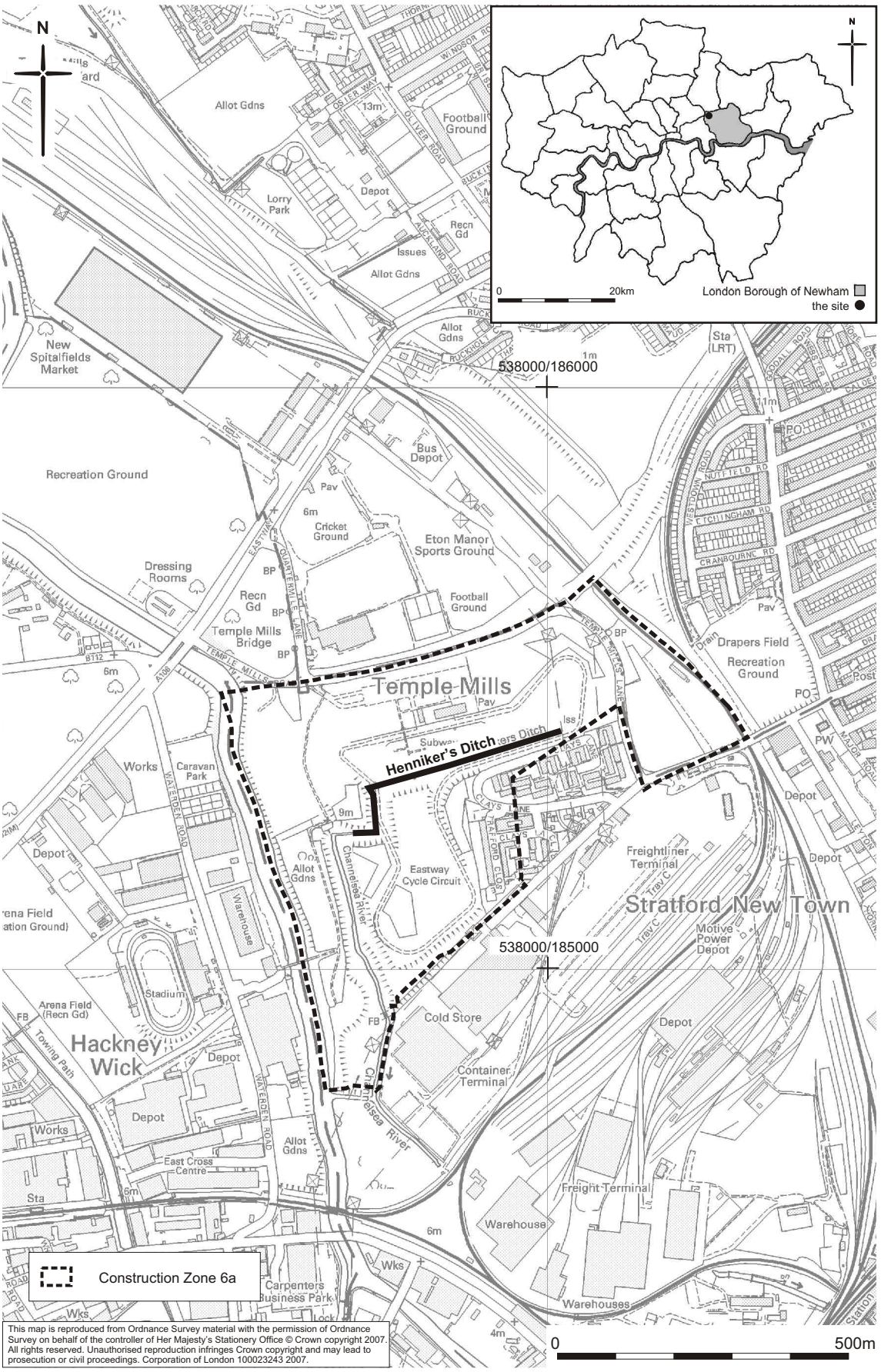


Fig 1 Site location

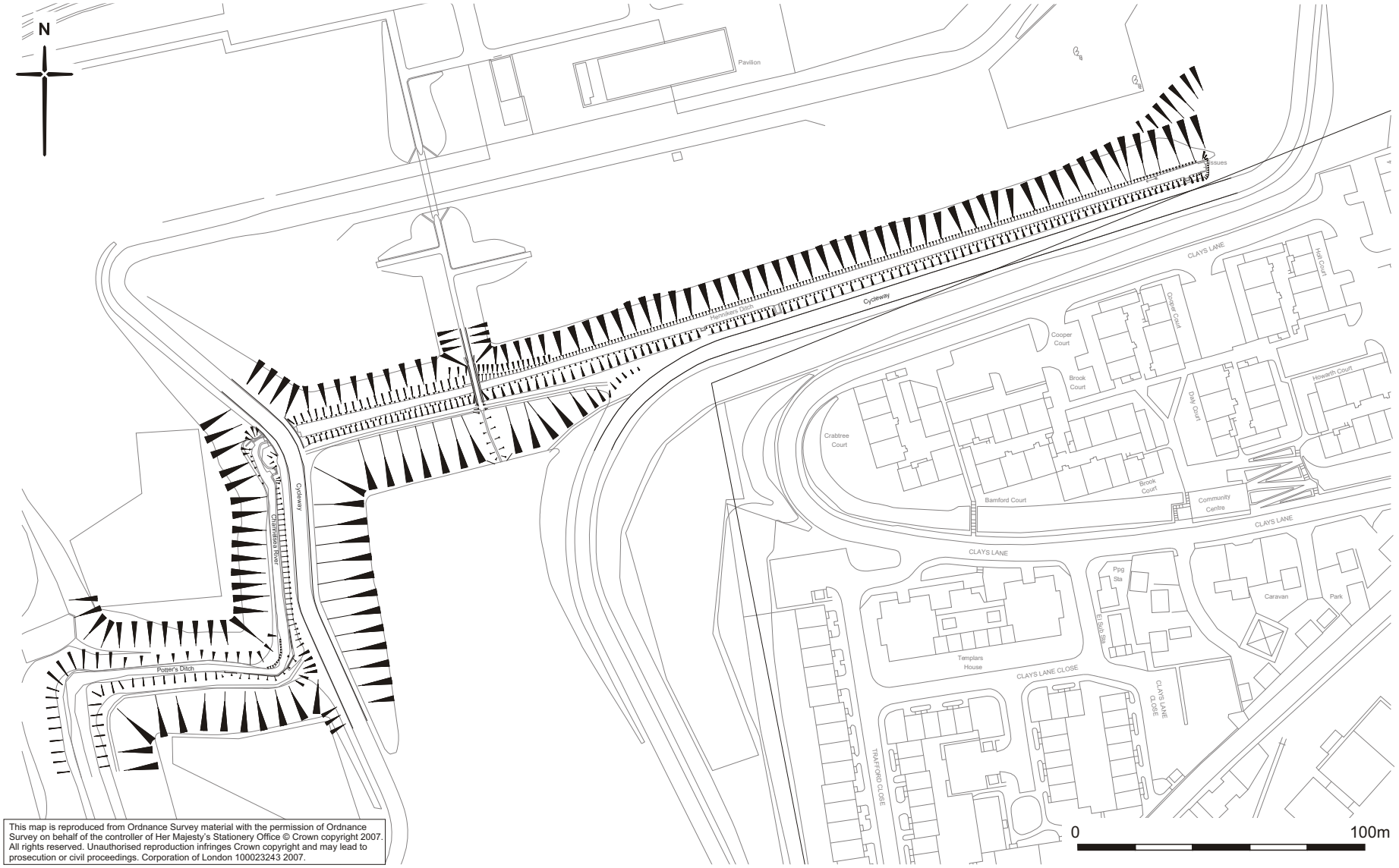


Fig 2 Topographic survey of Henniker's Ditch

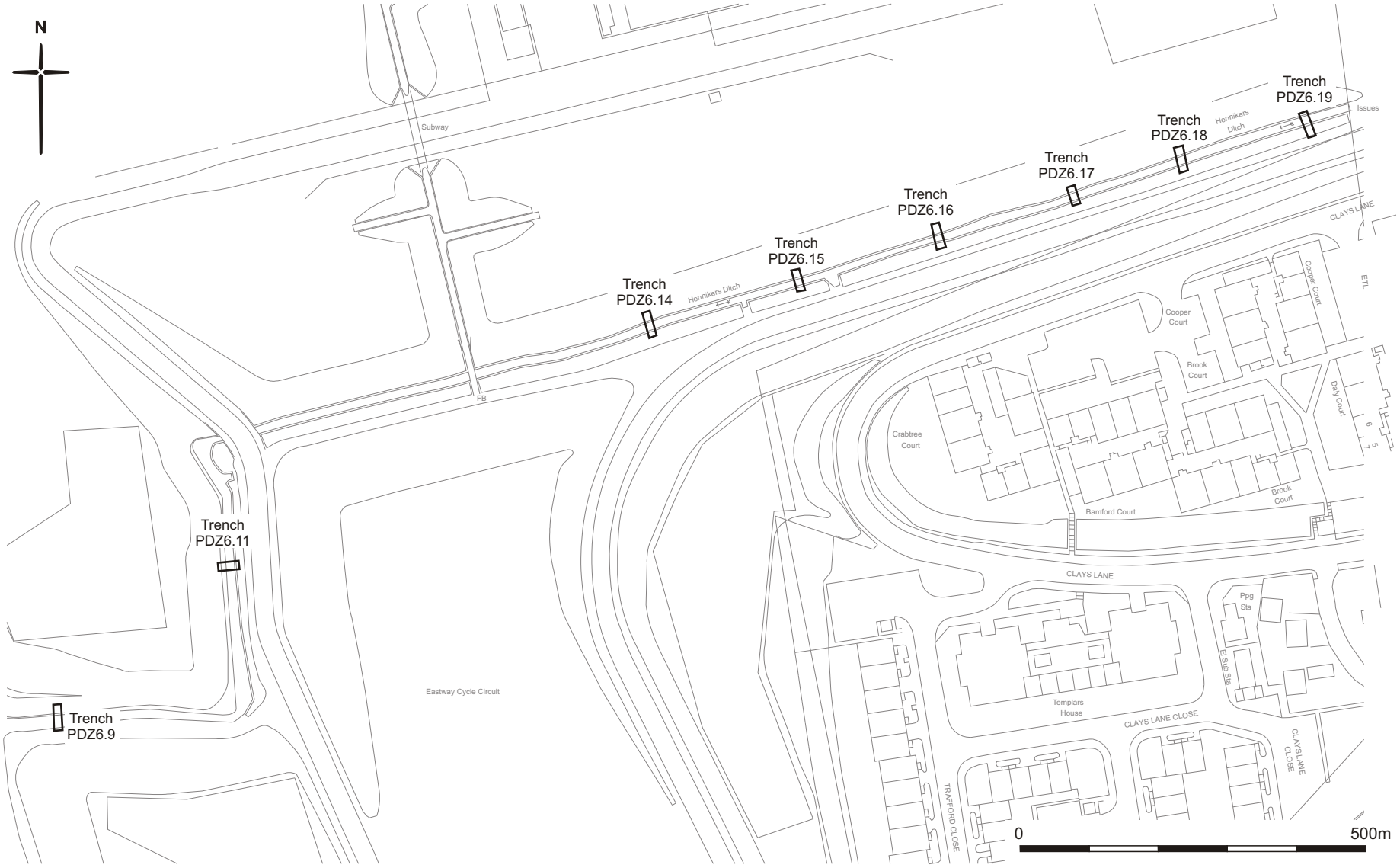


Fig 3 Location of evaluation trenches

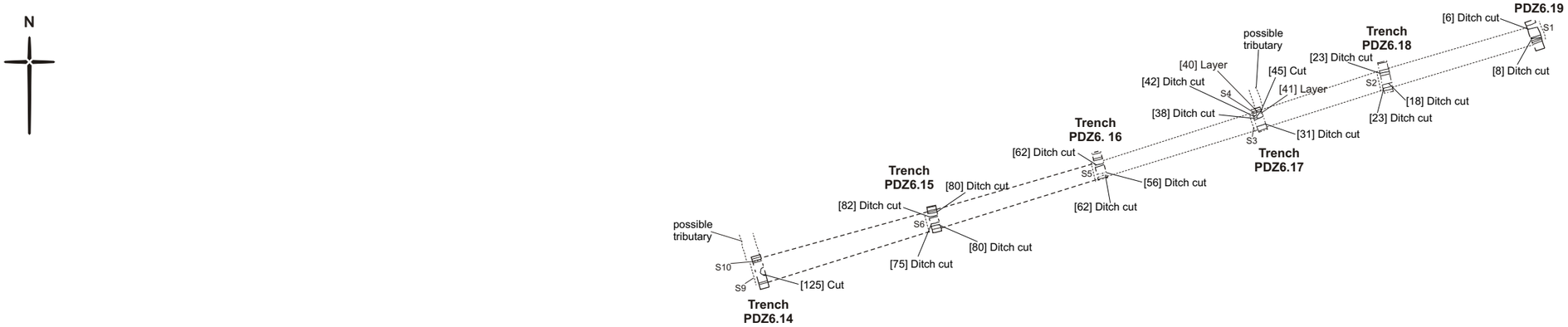
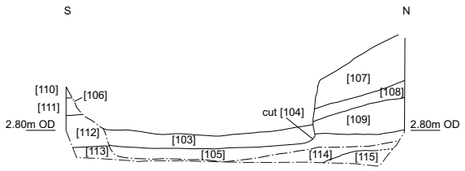


Fig 4 Detailed plans of evaluation trenches



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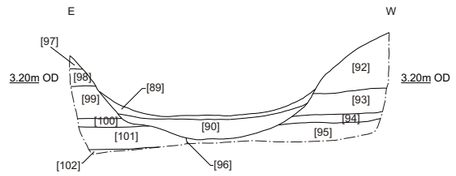

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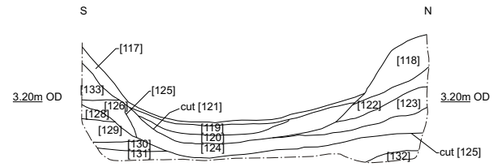

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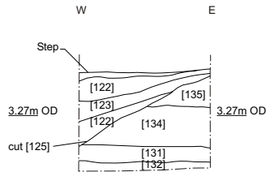

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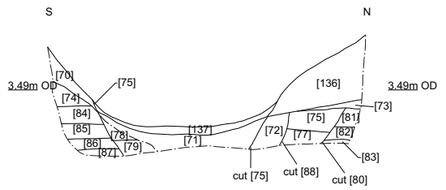

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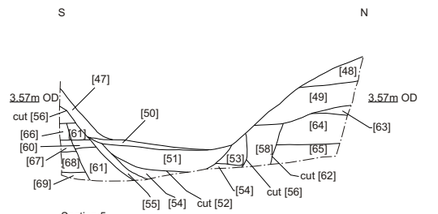

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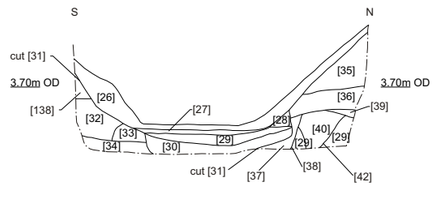

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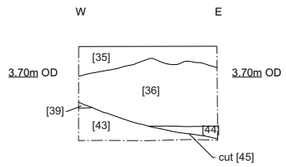

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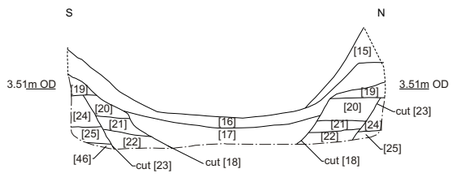
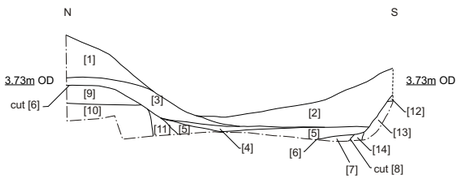


Section 2
East facing
Trench PDZ6.18



Section 1
West facing
Trench PDZ6.19

Fig 5 Ditch profiles

R:\Project\multi\1072\hennikers ditch\fig05