

**An Archaeological Evaluation at The Woolwich Line Enclosure &  
Powerhouse Site, Stratford City Development, London Borough of Newham**

Site Code: WWI 07

National Grid Reference: TQ 3827 8431

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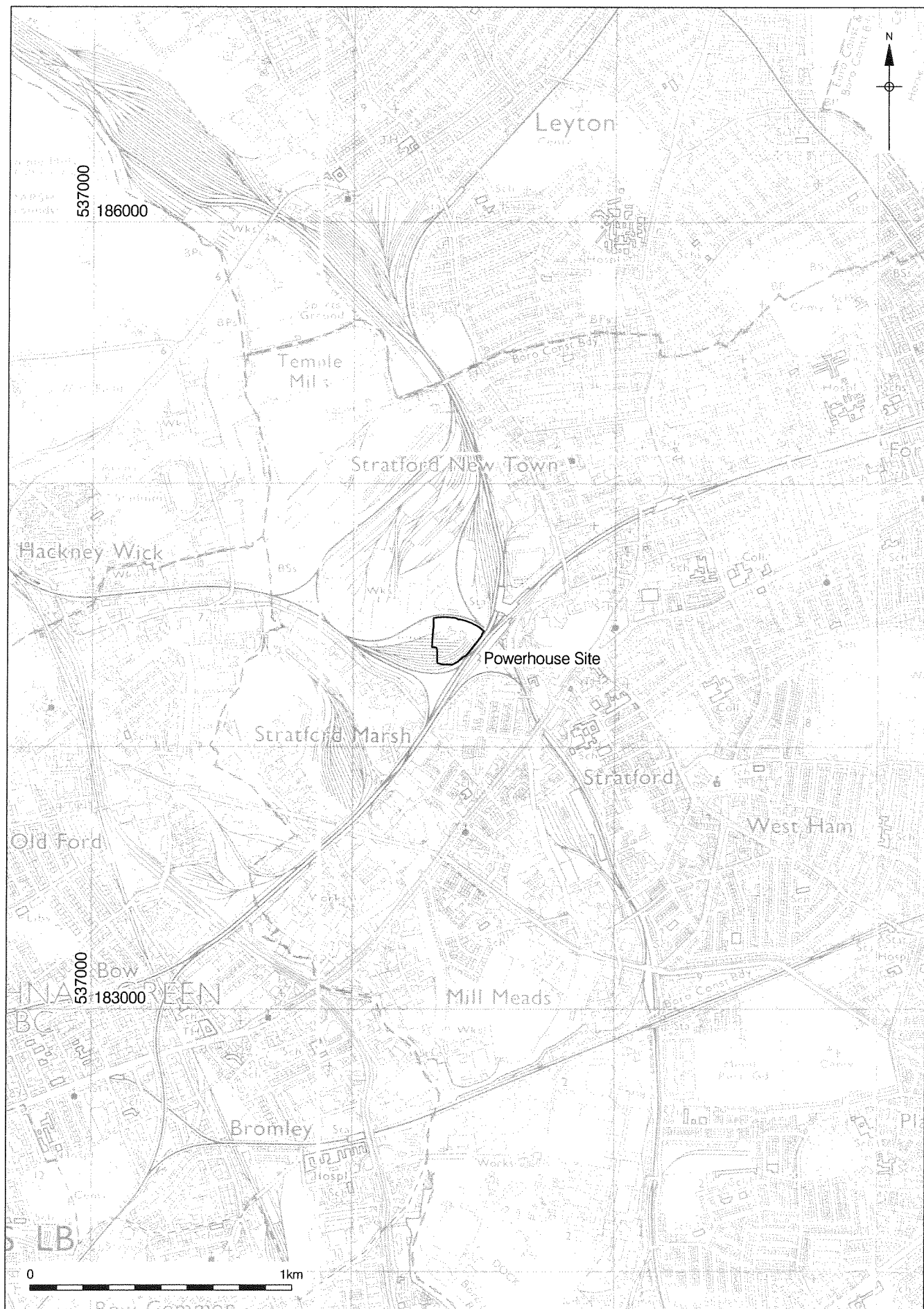
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## 1 ABSTRACT

- 1.1 This report details the results and working methods of an archaeological and geoarchaeological field evaluation carried out by MoLAS-PCA (Museum of London Archaeology Service & Pre-Construct Archaeology Limited) at the Woolwich Line Enclosure and Powerhouse Site, Stratford City Development, London Borough of Newham (now renamed Cherry Park). The central National Grid Reference is TQ 3827 8431. The evaluation was undertaken in two phases between 23rd - 27th July and 20th August - 14th September 2007. The work was commissioned by, and undertaken for, Norwest Holst Ltd on behalf of Westfield (UK). The archaeological works were monitored for the client by archaeological consultant Suzanna Pembroke, Ove Arup & Partners Limited, and for the local authority by David Divers, English Heritage (GLAAS). The work was project managed by Peter Moore and supervised by the author (WJ).
- 1.2 The evaluation comprised six trenches located within the footprint of the proposed development, one measuring 20m by 8m, one 23m by 11m, one 38m by 11m, one 8m by 2m and two 15m by 5m (Fig. 1).
- 1.3 The evaluation identified sandy gravels across the site. These represent the low terrace, thought to have been left high and dry following Late Pleistocene downcutting of the Lea Valley. The overlying sedimentary sequence represents the encroachment of wetter depositional environments, increased flooding and alluviation over the dry land of the low terrace. Monolith samples have been taken from these sediments. Drying out, due to drainage and water management from the medieval period onwards, lead to the development of a soil within the top of the alluvial clay. Late post medieval cutting or re-cutting of the Channelsea removed the soil in the area of the site and black, marshy ditch deposits accumulated within and at the margins of the feature. The natural sediments are therefore truncated (from just above +2.3m OD) and it is impossible to tell whether a Saxon water course, medieval mill stream or natural tributary flowed in this area. The consistent topography of the gravel surface (lying between +1.50 and +2.00m OD) suggests that had a natural channel existed in this part of the floodplain, it did not incise into the terrace and is therefore likely to be of Holocene date.
- 1.4 A considerable depth of 19th century dumped material was observed across the site. The direction and orientation of the layers suggests cutting and dumping into the area of the modern Channelsea. Archaeological features consisted of the structural elements of the early 19<sup>th</sup> century power station, and post medieval drainage features.

## 2 INTRODUCTION

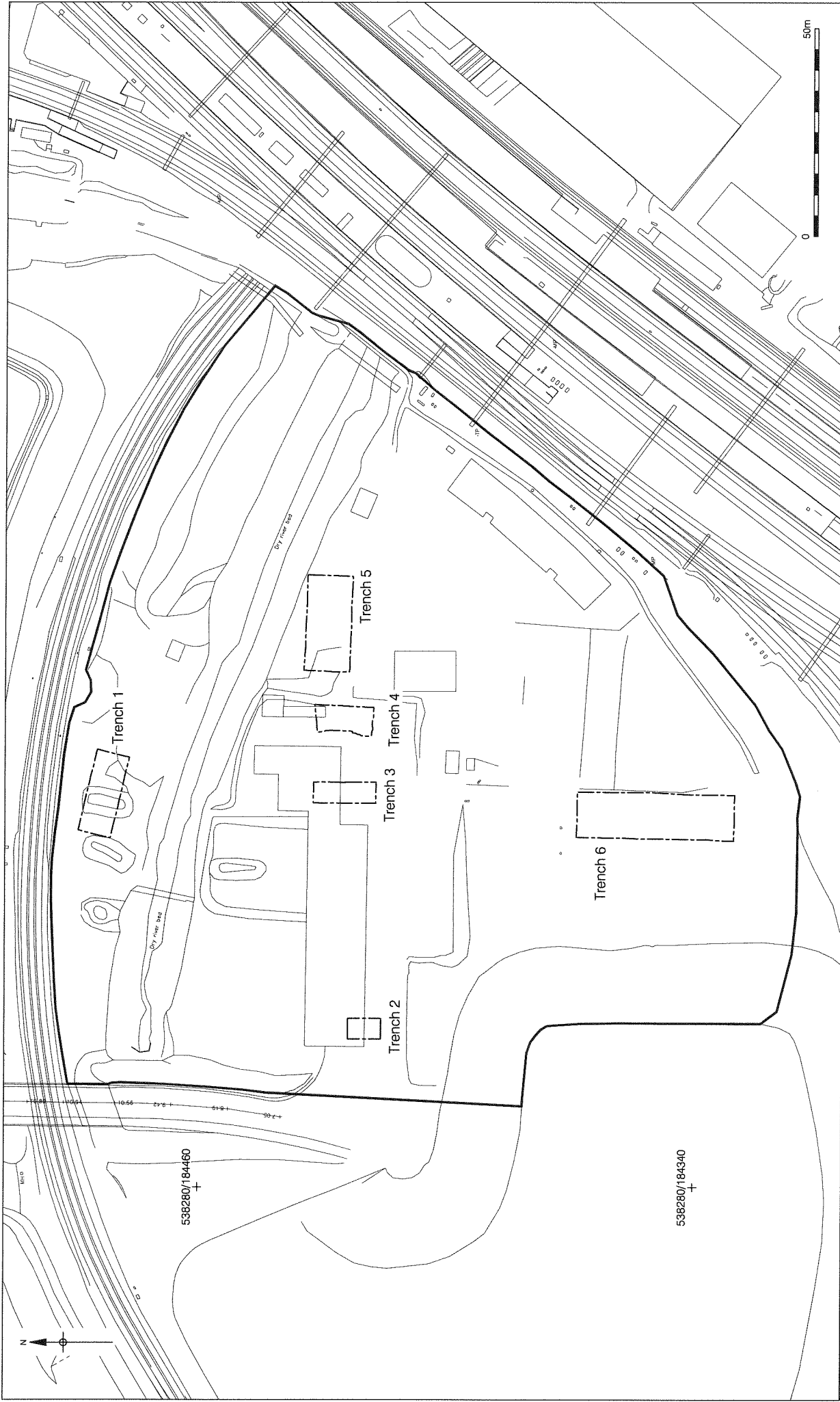
- 2.1 This report details the working methods and results of an archaeological and geoarchaeological field evaluation carried out by MoLAS-PCA between 23rd and 27th July and 20th August and 14th September 2007. The evaluation was undertaken at the Woolwich Line Enclosure, Stratford City Development, London Borough of Newham. The site is within the archaeological priority area as set out in Newham's Unitary Development Plan (London Borough of Newham: Supplementary Guidance: Archaeological Code of Practice 2002), and its archaeological significance is further detailed in The Stratford City Development Specification (Chelsfield Stanhope LCR 2003), and archaeological desk-based assessment (Pembroke 2007). The work was commissioned by, and undertaken for, Norwest Holst Ltd on behalf of Westfield (UK).
- 2.2 An earlier watching brief undertaken by MoLAS-PCA in the eastern part of the site at the Channelsea culvert (GNF06) showed the potential for waterlogged deposits and structures associated with the Channelsea in the area (Eastbury and Nicholls 2007). The programme of works for the subject site were agreed between Suzanna Pembroke and David Divers, and comprised six trenches targeting industrial archaeological, Roman, general and geoarchaeological research questions (Fig. 2). The methodologies for the works were set out in the written schemes of investigation (Moore 2007a and b).
- 2.3 The Powerhouse site (PWS06) lies towards the southern end of the Stratford City Development Zone and consists of land bounded by Stratford Station to the south-east, raised land to the west, and the Channelsea River to the north. The Woolwich Line Enclosure site lies between the Channelsea and the Woolwich railway line to the north.
- 2.4 The central National Grid Reference of the site is TQ 3835 8440
- 2.5 The site was given the code WWI 07.
- 2.6 The evaluation was supervised by the author (WJ) and project managed by Peter Moore. The archaeological works were monitored for the client by archaeological consultant Suzanna Pembroke, Ove Arup & Partners Limited and by David Divers of English Heritage (GLAAS) for the London Borough of Newham.



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Figure 1  
Site Location  
1:20,000 at A4



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Figure 2  
Trench Location  
1:1,250 at A4

### 3 GEOLOGICAL, ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

- 3.1 The following geological, archaeological and geoarchaeological background to the site have been set out in earlier reports (e.g. Halsey and Hawkins, 2007, Nicholls 2007; Eastbury and Nicholls 2007; Pembroke 2007) and are summarised below:
- 3.2 The Stratford City Site consists of made ground raising the ground level to between approximately 6.5m OD and 13m OD. The main course of the River Lea lies to the west of the site, in the vicinity of the Hackney Marshes. The site lies on the alluvial floodplain of the Lea (BGS sheet 257) bordered to the east by the Taplow Terrace, a former riverbed of the Lea deposited 128 to 280 thousand years before present (kyr BP) during the Wolstonian Glaciation. In this area the Taplow Terrace lies above the present floodplain at around +9 to +10m OD. Kempton Park Gravels, thought to date to around 30 to 140 kyr BP deposited during the Devensian cold stage, lie at roughly 0 to +5m OD.
- 3.3 Previous mapping of the gravel surface topography undertaken as part of the Lea Valley Mapping Project (LVMP, Burton et al, 2004) suggests that a 'low terrace' exists between the Taplow and Floodplain terraces extending along the east side of the valley from Temple Mills to Stratford. The site lies on this low terrace above the deeper parts of the floodplain, with a gravel surface between c +1m and +2m OD. At this elevated position, the low terrace would have remained dry until the Roman period in contrast to wetland areas to the west. The LVMP models show the height of gravels falls to -2.5m OD to the west of this low terrace (beyond the margin of the site). This is thought to result from downcutting or incision of the river during the Late Glacial to Interglacial transition (LGIT) and Holocene (10 – 15 kyr BP).
- 3.4 The timing of deposition of the low terrace gravels is therefore thought to have taken place during the late Pleistocene possibly before the last glacial maximum (LGM), but the date remains uncertain. The terrace may be analogous to the Kempton Park gravels mapped by the BGS further to the south near the confluence of the Lea and the Thames. However, a date at the base of the gravel at the Eastway Cycle Circuit of 22 to 24 kyrs Cal BP (thousand calendar years before present) (Beta-190620: 19620±250 BP), suggests the gravels accumulated during the last cold stage (around the LGM) and therefore form part of the Lea Valley Gravels (Gibbard, 1994). Over the early and mid-Holocene, the high and dry situation of the low terrace would have provided a suitable location for occupation due to its proximity to the River Lea.
- 3.5 Although in some parts of the site the made ground itself may be of archaeological interest, in general significant deposits are likely to lie between the base of modern made ground and the surface of the Tertiary bedrock. The bedrock pre-dates human evolution and on the present site is represented by the 50 million year old Eocene Woolwich and Reading beds that lie below river alluvium and gravel.
- 3.6 A Roman road, probably part of the road leading to Dunmow, was identified during the monitoring of utility works on Stratford Broadway in 1965 (LAARC: Site Record: HW-STB65). A junction between the London Dunmow road and the London Colchester road is thought to be located along the Broadway. This road, if identified correctly, will have an impact on the extreme south west of the Powerhouse Site, possibly in Trench 6.

- 3.7 A post medieval (18th century) silk mill (Henniker's Mill) has been identified from documentary sources at TQ 3823 8449 (AHDS: ADS).
- 3.8 An evaluation in 1994 at Gibbins Yard, Stratford E15 (LAARC: Site Record: HW-GY94) found a wide variety of riverside and riverine structures dating from the Saxon to post medieval periods. Another evaluation beyond the western boundary of the Powerhouse site located 19th century housing built on rubble on post medieval marshy fields (LAARC: Site Record: HW-BS93: Stratford Bus Station). Thus, it is possible timber found within 19th to 20th century dumping over the whole site could derive from these or similar structures, for example footbridges across the river.
- 3.9 The 1914 OS map of the area (Figure 3) clearly illustrates the greatest extent of the Powerhouse buildings, built in circa 1906 (Westman and Dwyer, 2007). Of particular note is the eastward extending corridor ending at a square structure, interpreted as a chimney with flues for removing hot gases and for heating incoming air. By 1951 most of the buildings had gone leaving the turbine room, a structure recently recorded and demolished prior to the present works (Westman and Dwyer 2007).
- 3.10 A watching brief carried out between 9th November 2006 and 30th January 2007 and 19th and 28th February 2007 on the Channelsea River during the installation of a new culvert observed a number of structures, mainly post medieval in date, apart from a possible revetment line of willow stake tips, which have been broadly assigned a date between the Iron Age and the early post medieval period (Eastbury and Nicholls 2007).



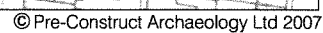


Figure 3  
1914 OS Map  
1:2,000 at A4

## 4 RESEARCH AIMS

4.1 As set out in the written scheme of investigation, the work aimed to establish the presence or absence of any archaeological deposits, structures or artefacts and to gather geoarchaeological information and samples. The work intended to:

- Describe prehistoric and historic depositional environments in this part of the Lea Valley
- Identify and assess the character of deposits that may relate to watercourses such as the Channelsea River that cross the site.
- Understand more fully the relationship between the changing landscape and prehistoric and historic human activity.

4.2 Further to these aims, the evaluation hoped to answer some of the following questions intended to address research priorities established in the Museum of London's *A research framework for London Archaeology* (2002).

- Does evidence for Mesolithic activity exist in the deposits recorded above Pleistocene gravel on the site?
- What are the characteristics of the gravel surface and overlying alluvium hitherto only observed in boreholes?
- Does any environmental evidence suitable for past landscape reconstruction exist within deposits associated with ancient channels of the River Lea or its tributaries?
- Can episodes of channel activity be dated?
- Is there evidence for an agricultural landscape in the post-prehistoric eras, and if so, how does it present itself? Is it possible to determine field boundaries and are they datable?
- Are there any *in situ* deposits of archaeological significance within the made ground or is it all of 19th/20th century dump and make-up deposits?

## 5 ARCHAEOLOGICAL METHODOLOGY

- 5.1 The evaluation comprised six trenches, one measuring 20m by 8m, one 23m by 11m, one 38m by 11m, one 8m by 2m and two 15m by 5m. Trench 1 was shortened by a few metres due to existing staked positions for piling, and carefully located to respect the railway line fence to the north by at least 2m. Trench 5 was re-orientated to lie east-west due to logistical constraints. All were excavated in accordance with the specifications outlined in the written schemes of investigation (Moore 2007a and b), and to the site specific health and safety requirements (Meddens 2007).
- 5.2 Excavation of the trenches was undertaken in spits using a 360 degree mechanical digger using a toothless ditching bucket under archaeological supervision. Where the water table was encountered, suitable areas were located for the digging of sumps, and pumps of varying capacity were installed.
- 5.3 Machining was halted once the natural gravel and sand had been located along the length of each trench or where archaeological structures were reached. The trenches were subsequently cleaned using appropriate hand-tools and any deposits and features identified were investigated, photographed and recorded using the single context recording method, and pro-forma context and planning sheets. Plans and sections were drawn at a scale of 1:10 and 1:20 where appropriate. Trench sections were also examined and recorded by geoarchaeologists and monolith and bulk samples were taken where considered appropriate for further consideration.
- 5.4 Temporary benchmarks were transferred across the site from a station point located to the north of the Powerhouse Bridge. The height provided by Norwest Holst engineers was 10.397m O.D. An additional station point was used by the surveyors to plot trench locations and other details,

## 6 TRENCH DESCRIPTIONS

### 6.1 TRENCH 1 (Figure 4, Figure 5, Figure 6 and Table 1)

- 6.1.1 Trench 1 was orientated east-west and measured 20m long by 8m wide, stepped in three times, to a depth of approximately 4m below ground level (Figure 1, Figure 2 and Figure 3).
- 6.1.2 Clast-supported small to medium black and brown gravel in a light bluish grey sand matrix are recorded at the base of the sedimentary sequence (context 6, facies 1). The gravel surface sloped gently from a height of +1.71mOD at the west end of the trench to +1.61mOD at the eastern end. These gravels represent Lea Valley Gravels (Gibbard, 1994) forming part of the low terrace underlying the modern floodplain. Facies 1 is thought to have accumulated before the LGM, remaining intact while to the west the gravel underwent reworking with glacial outwash immediately prior to the Holocene (15 to 10 kyr BP). Low terrace gravels were also identified during previous work at Stratford City (Nicholls, 2007), at Carpenters Road (the southern part of the New Aquatics Centre; Howell et al, 2005); Hackney Stadium, Waterden Road (Halsey and Thrall, 2005) and Marsh Lane (Bull and Halsey, 2007).
- 6.1.3 A gradational boundary between facies 1 and facies 2 (context 5) indicates gradual accumulation of the overlying yellowish grey brown heavily mottled sandy silt. This deposit sloped west to east (from +2.77m to 2.12m OD) with a typical thickness of 0.50m (maximum 1.20m). These sediments are interpreted as Pleistocene fine-grained material that accumulated on the Low Terrace, subsequently forming a dry land surface. Following westward late glacial downcutting of the Lea, the low terrace would have remained raised from the active floodplain. The sediments may have accumulated by Pleistocene alluvial processes but are weathered and oxidised due to exposure. Although prehistoric soil formation is likely to have impacted on these Pleistocene fine-grained deposits, visual inspection provided little evidence for soil formation within them on the Woolwich Line Enclosure site. Neither were archaeological finds and features found in the landsurface that is inferred to have developed at the surface of these Pleistocene deposits in Trench 1. However, prehistoric and Roman ditches are known to cut into these sediments elsewhere in the area, for example at Warton Road (OL-00305) (Halsey and Hawkins 2007).
- 6.1.4 Above facies 2 in Trench 1 lay a soft, plastic blue grey silty sandy clay mottled brown (facies 3). This deposit is interpreted as an accretionary floodplain soil accumulating by the built up of alluvium over the Pleistocene fine-grained material. Intermittent waterlogging (gleying) and drying out indicated by the colour and mottling suggests prolonged flooding and some soil formation processes may have taken place. The sediment is likely to have been deposited in an episodically flooded environment, and to have been carried onto the floodplain by the Lea or possibly a tributary flowing into the valley. Flooding may also have been influenced by the encroachment of tidal water into the lower Lea. Clay deposition on this raised part of the Lea floodplain is indicative of rising river levels and impeded drainage downstream, and may be partly due to increased amounts of sediment in the river system (perhaps due to prehistoric and later forest clearance, as well as the increased sediment carried in suspension in tidal water). Recent work on local sites suggests deposition of these minerogenic clays dates from the Roman period onwards.
- 6.1.5 A buried topsoil horizon (context 4, facies 4) with a thin turf line (roughly level at +3.12m OD) was recorded on the north side of Trench 1 and represents a stable land surface.

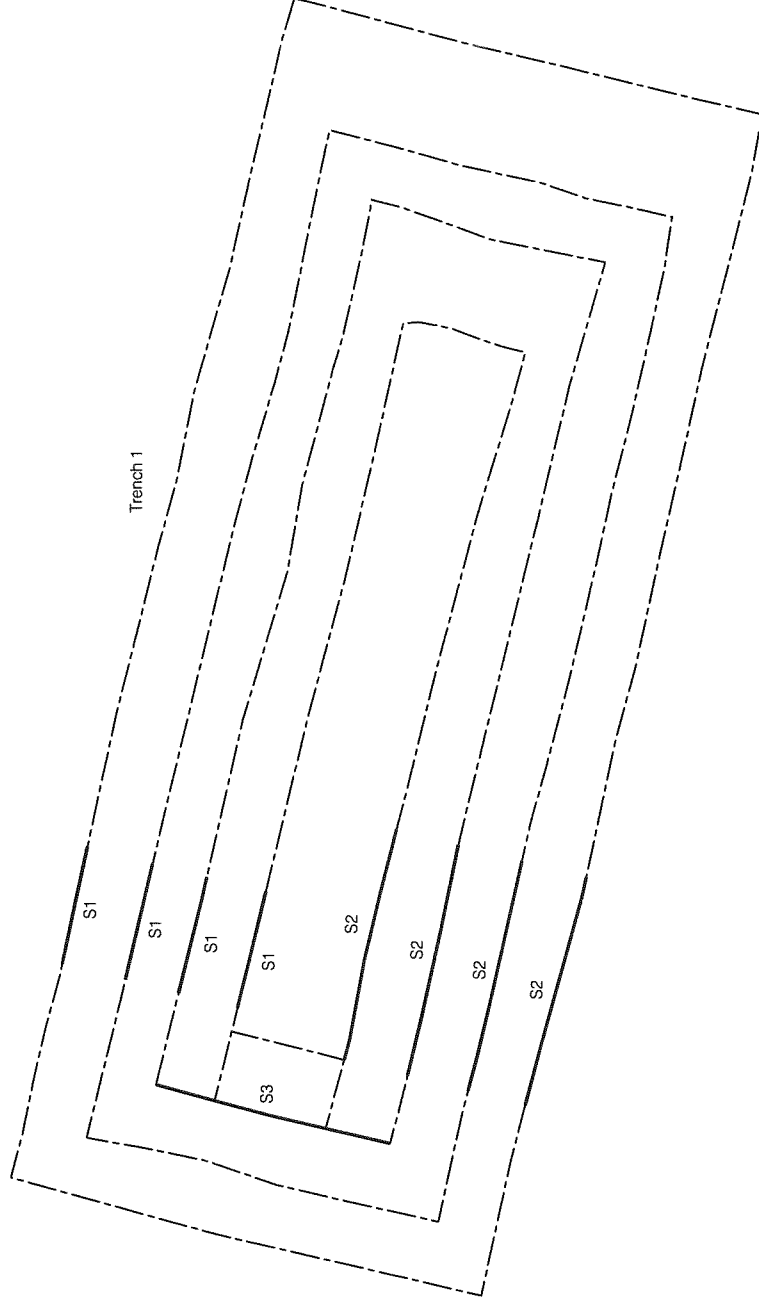
The gradational boundary between facies 3 and 4 suggests the soil formed within the upper horizon of the alluvium in the later historic period as pottery recovered dated to the 19th century. The south face of trench 1 was different in character, with a well-humified, black organic clay (context 3, facies 5) containing sand, silt, common fragments of wood, abundant small mollusc shells, 19th century pottery and corroded metalwork. This deposit formed an apparently discrete band over the blue grey alluvium of facies 3 and was seen to physically overlie the topsoil in the south facing section of the trench, dipping northwest to southeast (from +3.03mOD to +2.37mOD). Facies 5 appears to represent stagnant, waterlogged and vegetation-rich swamp-like environments. It may have formed at the edge of a ditch or possibly a slow-flowing channel. The clear lower boundary can only have been formed by a manmade cut, as the underlying deposits show that the Holocene sequence in this area is characterised by low energy (usually alluvial) sedimentation with little erosive force. The upper boundary is also sharp and clearly suggests modern truncation. This deposit appeared to seal a round stake [10] (though the top of it had rotted) which was driven through the underlying deposits [5] and [6].

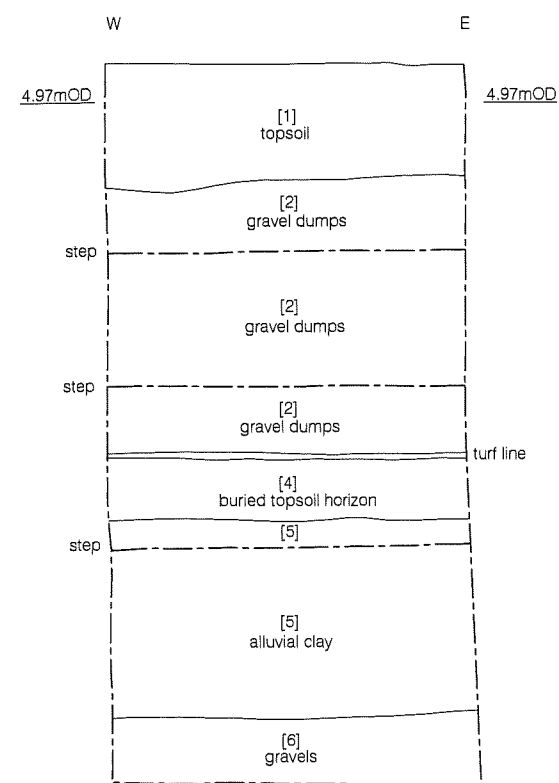
- 6.1.6 Sealing this sequence was a thick layer of made ground [2] (facies 6) consisting of three types of dump material varying in clay, sand and gravel content, at a height of 4.50-4.70m OD, and containing loose timbers towards its base ([7], [8], and [9]). This deposit clearly dates to the 19th century at earliest, and was sealed by topsoil [1].

Coordinates 538371.8752, 184482.8106, +2.58

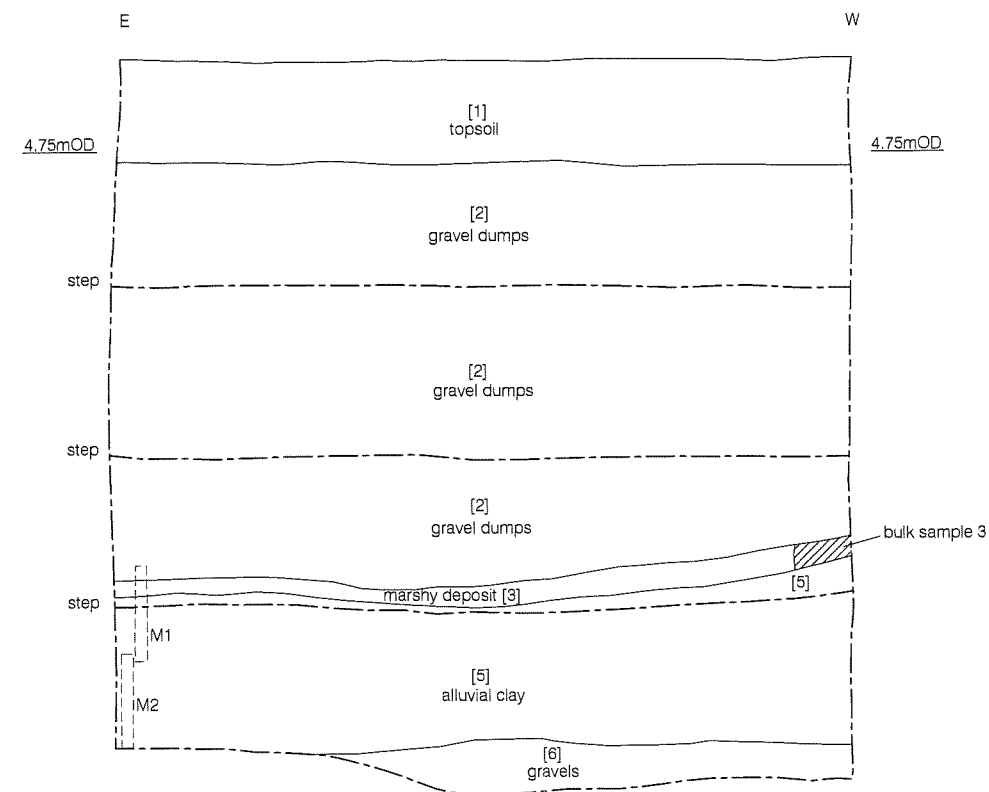
Natural sequence within north facing section trench 1 WWI07					
Facies	Depth from top of recorded section (m)	Description	Interpretation and period	Monoliths	
c +2.58m OD					
Facies 6 context 2	0.00	Soft orange sand and mid-brown silty sand CLAY with frequent CBM, metal and other modern material (see text 6.1.6)	made ground - possibly Victorian	Tr6M1 +2.58 - +2.08OD	
c +2.46m OD					
Facies 5 context 5	0.12	Moderately compact slightly friable black very organic (well-humified) CLAY with sand and silt	Possibly accumulated as late as Post medieval period, in proximity to man-made cut of Channelsea, used as drainage ditch – or fills of clay pits.		
c +2.33m OD					
Facies 3 context 5	0.25	Very soft, plastic blue grey SILTY SANDY CLAY mottled brown with roots visible. Brown mottling and sand content increasing with depth	Floodplain alluvium, subject to drying out and periodical waterlogging (gleyed). Mottling indicates weathering due to fluctuating water levels. Alluvium therefore accreting slowly and soil forming likely to be processes taking place - early historic period onwards		
c +2.12m OD diffuse gradational boundary					
Facies 2 context 5	0.46	Soft to moderate yellowish grey brown silty sand or SANDY SILT heavily mottled brown with dark brown root channels	Weathered silt - possibly Late Pleistocene fine-grained material accumulating on a dry land surface following downcutting of the valley to the west (late glacial)	Tr1 M2 +2.12m - +1.62mOD	
c +1.62m OD clear and gradational boundary					
Facies 1 context 6	0.96-1.00	Loose to moderate light bluish grey small to medium black and brown sub-angular clast-supported flint GRAVEL	River terrace gravels of Low Terrace or reworked river gravels - prior to the LGM		
c +1.58m OD limit of excavation					

Table 1: natural sequence within north facing section trench 1

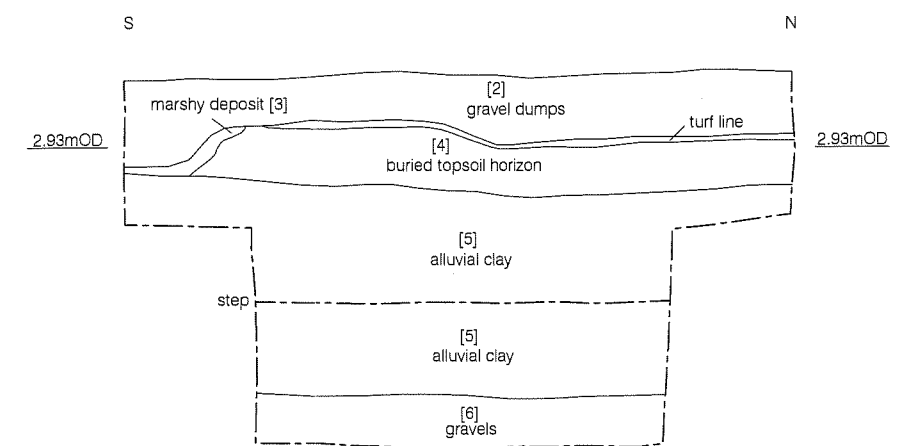




Section 1  
South facing  
Trench 1



Section 2  
North facing  
Trench 1



Section 3  
East facing  
Trench 1



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Figure 5  
Sections 1-3  
1:40 at A3



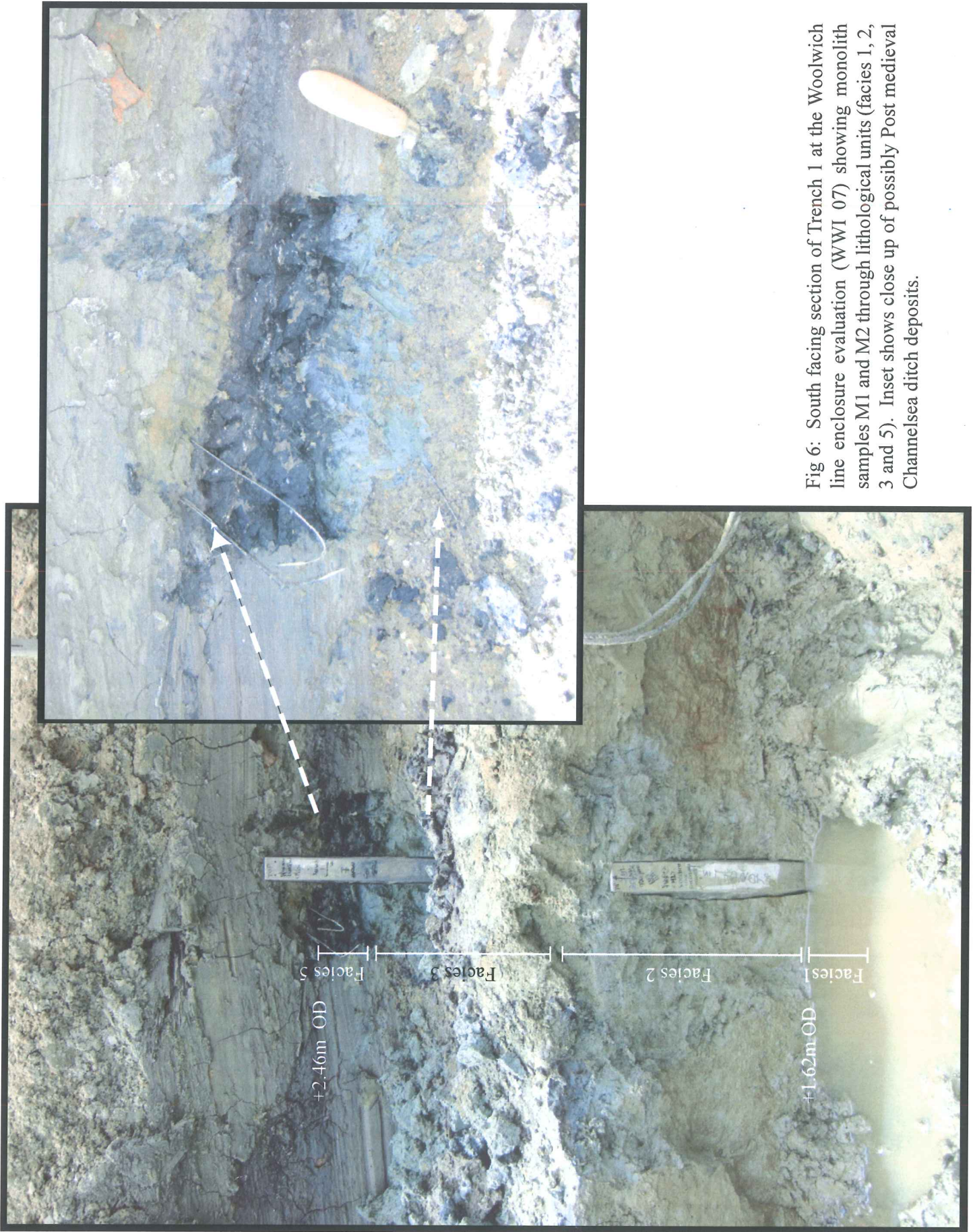


Fig 6: South facing section of Trench 1 at the Woolwich line enclosure evaluation (WWI 07) showing monolith samples M1 and M2 through lithological units (facies 1, 2, 3 and 5). Inset shows close up of possibly Post medieval Channelsea ditch deposits.

## 6.2 TRENCH 2

- 6.2.1 Trench 2 was located in the eastern part of the Powerhouse site and measured 8m N-S by 2m E-W. This trench aimed to identify the nature of a structure appended to the southwest of the Powerhouse. However no structural elements of any building survived intact in this area. The brick and concrete demolition rubble was observed to a depth of circa 4.4m, lying on truncated alluvial clay. The rubble was early 20<sup>th</sup> century in date, and therefore likely to be associated with the turbine room (see Figure 2 for the outline of the turbine room). No further excavation was undertaken and the trench was backfilled.

## 6.3 TRENCH 3 (Figure 7 and Figure 8)

- 6.3.1 Trench 3 was located in the centre of the former Powerhouse site, and measured 15m N-S by 5m E-W. The purpose of this trench was to locate the structure shown as a corridor on the 1914 OS plan, extending east of the main Powerhouse building (Fig.2).
- 6.3.2 The earliest deposits were observed in a sondage towards the north of the trench (outside of the corridor structure) and consisted of natural greyish yellow clayey gravels, observed between 1.66-1.68m OD, and sealed by 1.20m of bluish grey to greyish yellow clayey silts, at a height of 2.89m OD. This in turn was overlaid by 0.20m of dark greyish brown sandy clay silt at 3.09m OD, interpreted as a buried soil horizon, and the sequence was then sealed by brick and concrete rubble deriving from the demolition of the Powerhouse itself, to a height of 5.42m OD. The sequence below the modern demolition material parallels sequences found elsewhere (Trenches 1, 5 and 6).
- 6.3.3 In the southern half of the trench a sequence of structural elements identified as being part of the Powerhouse were recorded. The earliest elements were two E-W aligned concrete floors [24] and [25] at a height of 4.02m OD, which are interpreted as rafts upon which the walls of the E-W corridor structure identified on the 1914 OS plan were built. The former had frequent gravel inclusions, whereas the abutted floor [25] to the south presented a smooth inclusion free surface.
- 6.3.4 Two E-W walls, [20] and [21] were built on these floors at heights of 5.02m and 4.88m OD respectively. They were built of yellow and red frogged brick, both generally poorly fired and variable in colour, but mortared with a heavy duty light grey lime mortar. The bricks were reddened by heat discoloration on their internal faces, more so on wall [20] and less so on [21]. The bricks used were probably seconds, but the mortar used suggests their inherent weakness caused structural problems. Walls [20] and [21] formed a corridor which was infilled with a mid brownish red ashy silt [29] 0.17m thick, surviving to a height of 4.17m OD. This was in turn sealed by a dark reddish brown sandy silt [19], 1.40m thick, surviving to a height of 5.42m OD. The latter included frequent yellow and red frogged bricks, moderate slate fragments, iron machine and tool parts, and coal, and occasional ceramic and material probably deriving from bakelite electrical equipment.
- 6.3.5 A second corridor was defined by wall [21] and a 0.40m wide E-W wall [23] to the south (surviving to a height of 5.05m OD). This had no traces of deposit [29] but was infilled with [19]. The width of this passage may have been narrowed at some time as wall [23] was interpreted as having replaced earlier brick wall [22] to the south. [23] was built of blue engineering brick and yellow frogged brick, loosely mortared in place with a yellow lime mortar, with traces of a grey mortar on the bricks themselves. This suggests some of these bricks were reused. It was apparent from surface observation that [23] was

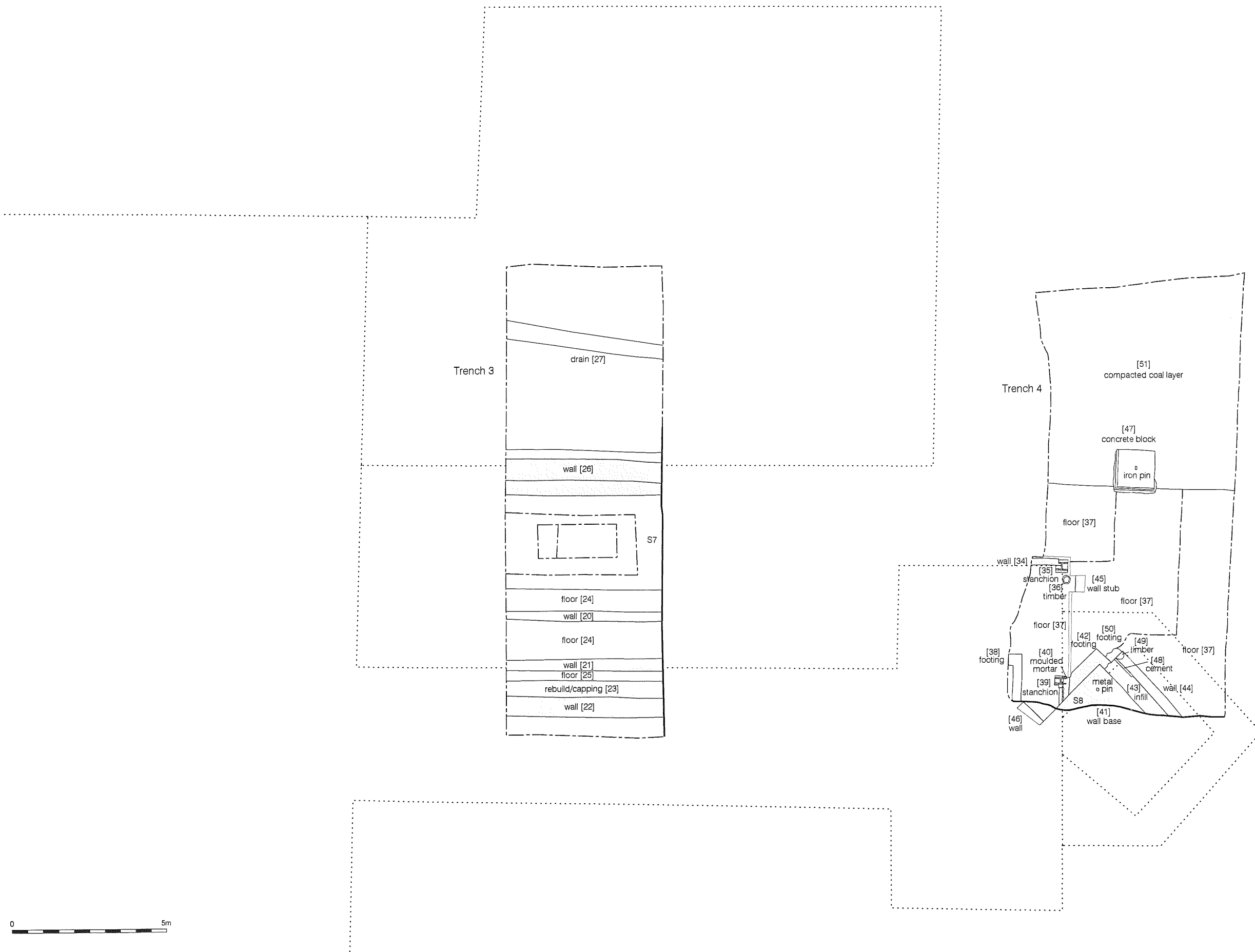
recessed into the floor [25] about 10mm down, but impossible to confirm whether this was a later truncation. Wall [21] had been broken through in three places, and given the positioning of two groups of four iron pins (250-350 mm diameter, 2.14m apart) near the breaks they may represent the removal of plant or machinery.

- 6.3.6 Due to the proximity of the limit of excavation to the south it was not possible to determine what was stratigraphically below [22], an E-W structural element surviving to a height of 4.67m OD. Also, it is unclear how much further north it extended, where it was built upon by [23]. However, a minimum width of 0.78m was recorded. [22] was built of bricks similar to those observed in [20] and [21], and smeared and sooted by a friable black charcoal layer [30], approximately 30-80mm thick, and extending no further than 0.27m south of [23]'s southern face, itself also sooted 100mm up. A modern brick capped electric run truncated [22] to the south, also forming the limit of excavation. The double corridor nature of this structure would support the interpretation of this feature being a flue for bringing hot gases to a chimney and the heating of incoming air to the furnaces.
- 6.3.7 The remaining structures recorded were: [26], an E-W wall (0.6m wide) built on a concrete foundation (1.20m wide), surviving to a height of 4.65m OD, which is identified as a room extending out northeastward from the turbine room, and [27], a drain run built of concrete with consolidated yellow brick, roughly aligned E-W, 0.60m wide and surviving to a height of roughly 5.00m OD. Both structures were sealed by brick rubble deriving from the demolition of the Powerhouse.

#### 6.4 TRENCH 4 (Figure 7 and Figure 8)

- 6.5 Trench 4 was located at the eastern end of the former Powerhouse, measuring 15 by 5m, and was excavated to record the rhomboid end of the corridor structure identified from the 1914 OS plan (Fig.2) and located according to its position within Trench 3. Unfortunately due to the proximity of the trench to a major site haulage road the trench could not be extended any further to the south.
- 6.5.1 An isolated concrete block [47] at a height of 5.32m OD was recorded in the northern half of the trench. The block had a wrought iron pin in its top face. It may be 19th century in date, and the presence of a pin could indicate it was a machine block. Certainly there is little around it that would suggest a more mundane function, and although only 1.22m square, it was set 1.50m below the level of an associated 70mm thick layer of coal. It probably related to the Powerhouse building, function unknown.
- 6.5.2 The earliest wall [45] observed at a height of 3.90m OD, was 0.30m wide, and appears to have been truncated prior to the evaluation. The brickwork was obscured by concrete and was sealed by a concrete floor [37] at a height of 4.01m OD, itself about 0.45 thick, and located in the south west part of Trench 4. Possibly it relates to an earlier phase of the Powerhouse building, or earlier structure. Concrete foundations [42] and [50] were recorded at the same stratigraphical level as [37], at heights of 4.01m and 3.89m OD respectively, and various brick and concrete structures were built on them.

- 6.5.3 A remnant of an 'L'-shaped concrete footing [38] (0.32m wide), both blocked and corresponded to the line of the northern side of the corridor, effectively funnelling gases to the centre of the rhomboid structure. Various structures and fittings, such as upright timber [36], iron stanchions [35] and [39], and E-W wall [34] were recorded but their exact function is unknown.
- 6.5.4 Brick-built structure [41] corresponds with the rhomboid end to the corridor identified on the 1914 OS plan. It survived to a height of 5.32m OD, and appeared to be a solid mass of brickwork at least 2.44m N-S, 1.80m E-W, and 1.30m thick, composed of frogged yellow brick. Another wall [46], comprising similar brickwork, had been bonded to [41]'s north-west face, surviving to a height of 5.29m OD, and extending 0.85m south-west from [41]. The rest of the wall is beyond the southern limit of the trench. The surface of the brickwork appeared slightly blue, possibly a result of discoloration by infill [43]. Parallel to [41]'s north-eastern face a concrete wall [44], skimmed with cement on its south-western face [48], both at a height of 5.19m OD, had a timber upright insert in its north-western end [49] also surviving to a height of 5.19m OD.



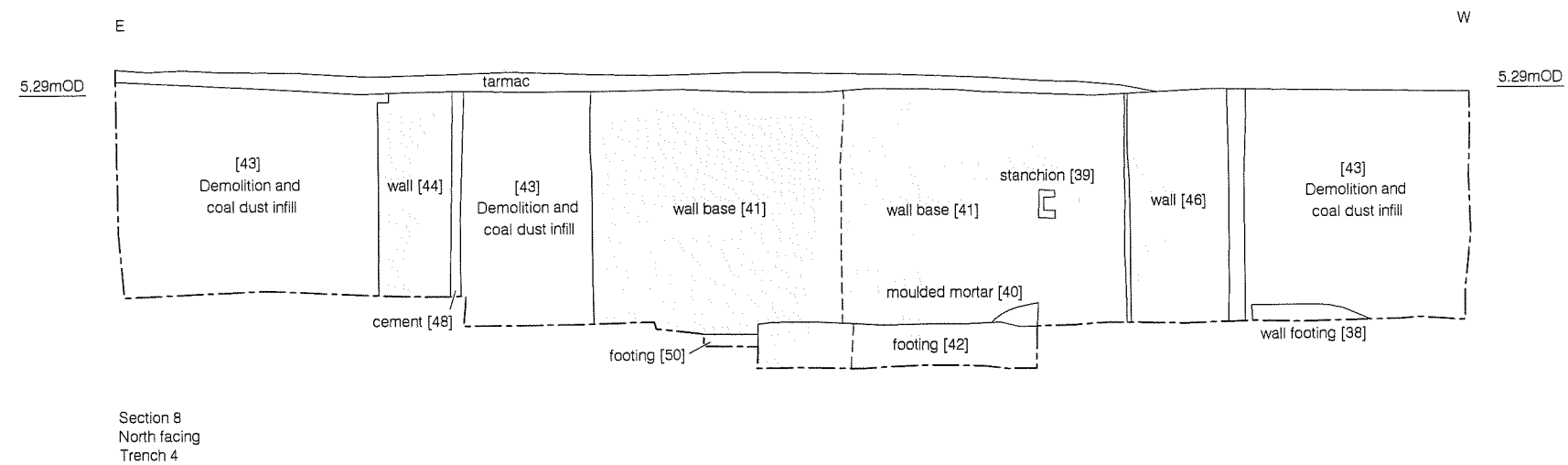
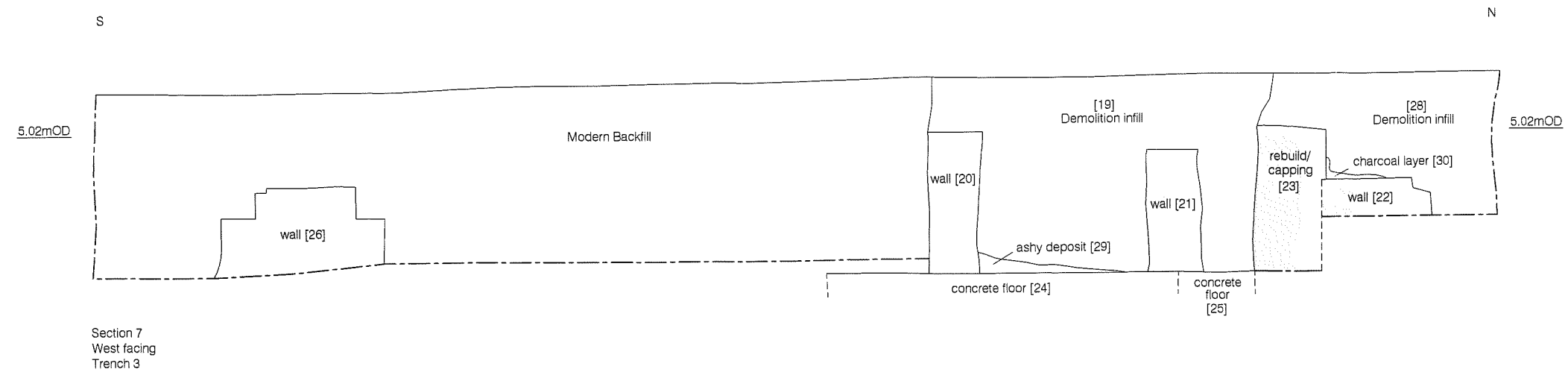
0 5m

----- Detail from 1914 OS Map showing the outline of the Powerhouse

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Figure 7  
Trenches 3 & 4  
1:125 at A3





## 6.6 Trench 5

- 6.6.1 Trench 5 was excavated on an E-W axis to the south of the line of the Channelsea. It measured 23m E-W and 11m N-S and reached 1.25m OD, stepping in four times. During machining an ancillary building associated with the Powerhouse was recorded and then removed to permit investigation of the buried stratigraphy beneath.
- 6.6.2 The lower part of the sedimentary sequence of Trench 5 broadly corresponds with that of Trench 1. Facies 1, recorded at the base of the trench comprised horizontal beds of grey sub-rounded clast-supported gravels in an orange grey coarse sandy matrix (context 62). Due to groundwater ingress the bedding structure of the deposit could not be exposed and fully observed, but the surface of the deposit lay between +1.25m OD and +1.68m OD sloping slightly to the east. As in Trench 1, facies 1 represents the low terrace, deposited before the LGM.
- 6.6.3 Moderate yellowish grey brown very mottled fine sandy silt with root channels and sand lenses (context 61, facies 2) overlay terrace gravel between +1.45m and +1.88m OD (approximately 0.90m thick). This is interpreted as oxidised and weathered material accumulating prior to the downcutting of the valley to the west during the late glacial. These Pleistocene deposits may have accumulated by various processes (such as fluvial, aeolian and slope wash mobilised by freeze-thaw), and in this sense they may appear similar to brickearths, such as the orange brown sandy clay of facies 2 observed during boreholes monitoring at Powerhouse (PWS06) (Nicholls, 2007). Although soil development and a clay component were not evident in Trench 5 facies 2, the deposit is thought comparable to PWS06 facies 2 and WWI07 trench 1. This deposit is sampled in Trench 5, monoliths 1 and 2. Finds were not recovered but, as noted above (6.1.2) at OL-00305 Roman and prehistoric features were recorded cut into this type of sediment sealed by alluvium.
- 6.6.4 Moderate to firm blue and yellow grey sandy silty clay (context 60, facies 3) was recorded between approximately +2.27m to +2.76m OD (sampled in trench 5, monoliths 1 and 2), with poorly sorted flint inclusions, blackened root channels and mollusc fragments. This alluvium represents increased flooding and alluviation producing episodically waterlogged meadow-like environments. This is attributed to the general Holocene trend of rising river levels and poor drainage (see 6.1.4).
- 6.6.5 In the section furthest from the modern Channelsea alluvium graded up into a dark brown loam at approximately +2.92m OD (a maximum of 0.30m thick) with charcoal and poorly-sorted flint, interpreted as a buried topsoil with a visible turf line (facies 4). Late post medieval pottery was retrieved from this context and it may represent soil development following drainage of the seasonally flooded alluvial fields.
- 6.6.6 As with Trench 1 the north and south facing sections appear different in character. A very black humic silty clay with clinker and abundant reeds (giving the deposit a 'hairy' texture) was recorded in the east end of the south facing section (facies 5) (Sample Trench5, monolith 1). This is interpreted as the equivalent of the sediments seen in Trench 1 that indicate waterlogged and organic-rich deposits stagnating at the edge of a cut ditch (6.1.5). On the basis of the sediments observed, it not possible to tell whether this feature was originally a natural watercourse, as the natural sequence is truncated from just above +2.3m OD. However, the sharp contrast between both sides of the Trenches 1 and 5 suggest that in both cases the organic deposits represent the fills of man made cut features, such as brickearth pits, which, following their excavation, would

have formed boggy hollows within the fields and rough scrubby grassland of the low terrace.

- 6.6.7 Sealing the sequence described above was thick made ground [58] (roughly 2.60m) consisting of various tips of clayey sands, gravels, sands and sandy silts. From the direction of slumping and orientation of the layers of post medieval cutting and dumping it appeared that material has been tipped into a depression in the landscape in the area of the modern Channelsea. No modern turf line was observed although the ground had been raised in this area. Cutting through the majority of this context were several walls with associated foundations. Wall [52], located at 6.26m OD comprised a substantial E-W wall with two N-S cross walls, all with stepped foundations. Wall [57] located at 6.35m OD was a stretch of wall and concrete footing comprised of yellow stock brick, only visible in face of S.10. Feature [56] located at 5.70m OD comprised a stretch of poorly fired brickwork, only visible in face of S.9. Feature [53] located at a height of 5.56m OD, was probably a modern soakaway found in the north-west part of the trench. Feature [52] was sealed by a concrete raft [54] at a height of 6.03m OD. The walls and foundations correspond roughly with the "U-shaped" building shown on the 1914 OS Plan (see Figures 3 and 8 for the outline).

6.7

Coordinates 538419.9310, 184450.2770, +2.84				
Natural sequence within south facing section trench 5 WWI07				
Facies	Depth from top of recorded section (m)	Description	Interpretation and period	Monoliths
Facies 6	-	Silt, sand and gravel (see text 6.6.7)	Victorian make up/landfill/dumped material.	Tr5M1 +2.45- +1.95m OD
c +2.45m OD				
Facies 5	0.00	Soft to moderate very black HUMIC SILTY CLAY with abundant reeds and some clinker. Vole tooth noted in section	Possibly marginal to the man-made course of the Channelsea. Appears to cut through unit below - modern or Post medieval. Could also be the boggy fill of a clay pit.	
c +2.37m OD clear boundary				
Facies 3 context 60	0.08	Moderate to firm blue and yellow grey SANDY SILTY CLAY with occasional small poorly sorted flint clasts and black root channels penetrating from boundary. Fragments of mollusc and other sand-sized unsorted inclusions	Accretionary alluvial floodplain sediments. Dry land sequence with possible evidence of soil formation - historic period onwards	
c +1.88m OD very diffuse boundary				Tr5M2 +2.37-+1.87mOD



Facies 2 context 61	0.43	Moderate yellowish grey brown very mottled fine SANDY SILT with darker root channels and sand lenses	Weathered silt - possibly Late Pleistocene fine-grained material accumulating on a dry land surface prior to downcutting of the valley to the west (late glacial)	Tr5M3 +1.95 - +1.45m OD
c +1.45m OD clear gradational boundary				
Facies 1 context 62	1.00 - >1.05	Planar/horizontal beds of grey medium sub rounded clast supported GRAVELS in coarse orange grey sand matrix - not fully observed due to ground water ingress	River terrace gravels of Low Terrace or reworked river gravels - prior to the LGM	
c +1.50m OD limit of excavation				

Table 2: natural sequence in south facing section trench 5

## 6.8 Trench 6 (Figure 11, Figure 12, Table 3 and Table 4)

- 6.8.1 Trench 6 was located in the south-western part of the Woolwich Line enclosure site, and was designed to evaluate the area of the projected line of the Roman road crossing the Lea Valley between Old Ford and Stratford. It was accordingly set out at 38m N-S x 11m E-W across the presumed line. The trench was stepped four times, which gave an overall maximum depth of 4.50m with the base at 1.55m OD.
- 6.8.2 At the base of the sequence with a surface lying between approximately +2.20m +1.70m OD lay poorly sorted clast-supported rounded to sub-angular flint gravel in a matrix of clay, silt and coarse sand [12], [15], and [32]. This deposit comprised river terrace gravels of the low terrace seen at the base of all trenches, deposited prior to the LGM.
- 6.8.3 The sedimentary sequence fined up from gravels into a moderate to soft mid-orangey brown and light grey silty clay approximately 0.50m thick, dipping from east to west (from +2.64m to +2.18m OD) with frequent crumbly orange iron concretions and sand lenses ([11], [14], [31], facies 2). This facies is interpreted as the weathered material accumulating in the Late Pleistocene on the low terrace floodplain prior to late glacial downcutting seen in other trenches (see 6.1.3 and 6.6.3). The iron concretions are produced by wetting and drying of the sediment perhaps indicative of natural fluctuations in the water table or due to the gradual rise in water levels over the Holocene.
- 6.8.4 The gradational boundary between facies 2 and 3 is typical of the sequence noted in other trenches (e.g. in Trench 1 Figure 6). The overlying sediment ([13] and [33] facies 3) comprised a moderate to soft light grey silty clay with flecks of Manganese and iron concretions. This grades into a light brown and grey clayey silt with some sand and fine roots. The deposit (<0.30m thick) dipped east to west from +2.90m to +2.05m OD and represents clays deposited carried on the floodplain in times of inundation occurring from the Roman period onwards, becoming progressively exposed and weathered (indicated by increasing root material and concretions of iron and manganese). This accumulation is due to *inter alia* rising river levels and impeded drainage downstream (see 6.1.4). The alluvium in Trench 6 appears to have been subject to weathering, perhaps as a result of local drainage and water management.
- 6.8.5 A gradational boundary lies between facies 3 and the overlying buried soil under the thin turf line (facies 4). The formation of a soil horizon within the top of the alluvium suggests conditions drying out and colonisation by vegetation. This is assumed to be equivalent to the topsoil (facies 4) recorded on the north side and south respectively of Trenches 1 and 5 and was sampled (trench 6 monoliths 1 and 2).
- 6.8.6 A soft dark grey or black organic clay was recorded in the southwest corner of the trench with light grey alluvial silty clay lenses, frequent molluscs, plant fragments and glass. The deposit lay between approximately +1.90 to +2.20m OD and was sampled in trench 6 monolith 3. Although the deposit is similar in character to facies 5 (Trenches 1 and 5) it is observed directly overlying gravels 0.10 to 0.40m lower than in the other trenches (see Table 1 and Table 2). Trench 6 is clearly not associated with the modern Channelsea and can be seen to fill a cut [18] extending west of the limit of the trench and petering out roughly 10.50m north of the south-west corner. The deposit is interpreted as either a post medieval ditch likely to be associated with drainage and water management that took place in the area from the medieval onwards (Eastbury and Nicholls, 2007), or it may also be the boggy fill of a former clay pit, left to form a pond which gradually silted-up.

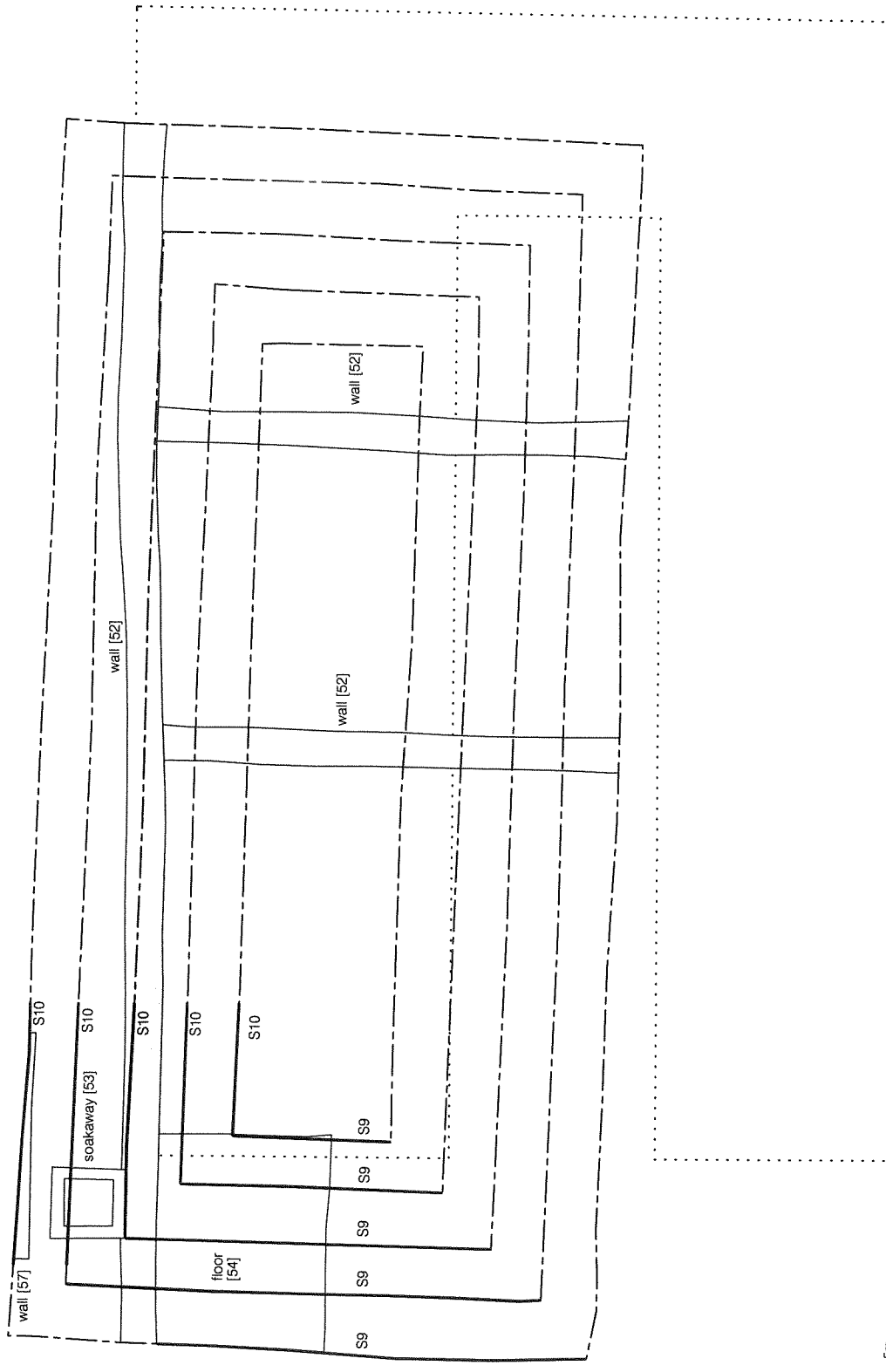
- 6.8.7 A series of 19th to 20th century domestic waste dumps (4.10m thick) and landfill [16] at approximately +6.15m OD completed the sequence in Trench 6 (facies 6).

Coordinates 538375.1873, 184353.0091, +2.53					
Natural sequence within east facing section trench 6 WWI07					
Unit	Depth from studied section (bgl)	Description	Interpretation and period	Monoliths	
c +2.53m OD					
Facies 4	0.00	Black partially decomposed turf.	Pre-dumping turf line.	Tr6M1 +2.53-+2.03m OD	
	c +2.51m OD				
	0.02	Firm mid greyish-brown SILT LOAM. Frequent fine roots. Moderate medium sand and occasional rounded pebbles. 2 cm above lower interface moderate coarse sand (angular to sub-rounded and coarse sand sized pot/CBM fragments.	Buried soil (B horizon) under turf line. Drier conditions than during alluvial deposition (following river embanking or straightening or other management?).		
c +2.33m OD clear gradational boundary					
Facies 3 context 13 and 33	0.20	Firm mottled light brown and grey CLAYEY SILT. Moderate medium sand. Moderate fine roots. Occasional small blue concretions around fine roots. Grey mottling due to rooting (infilled channels). Frequent Mn staining (rootlets).	Floodplain soil deposit formed in an episodically wet environment, becoming more regularly exposed and weathered from 0.20 to 0.30m bgl – early historic onwards		
	c +2.23m OD gradational boundary				
	0.30	Moderate to soft light grey SILT/CLAY. Frequent Manganese staining (rootlets) (from 0.3 to 0.38) followed by Manganese flecks and iron concretions.			
c +2.03m OD very diffuse boundary					
Facies 2 context 11, 14 and 31	0.50	Moderate to soft mid-orangey brown and light grey (becoming darker with depth) SILTY CLAY. Frequent crumbly rounded orange Fe concretions (c.1-2mm). Occasional coarse sand and rare unsorted angular pebbles	Weathered fine-grained material accumulating on the Late Glacial floodplain and subject to prehistoric (and later) soil formation.		Tr6M2 +2.07 - 1.57m OD
c +1.73m OD clear boundary					
Facies 1	0.80-0.96	Poorly sorted clast-supported COARSE SAND AND GRAVEL (Rounded to sub-angular) in silt/clay matrix.	River terrace gravels of Low Terrace or reworked river gravels – deposited in late Devensian		
c +1.57m OD limit of excavation					

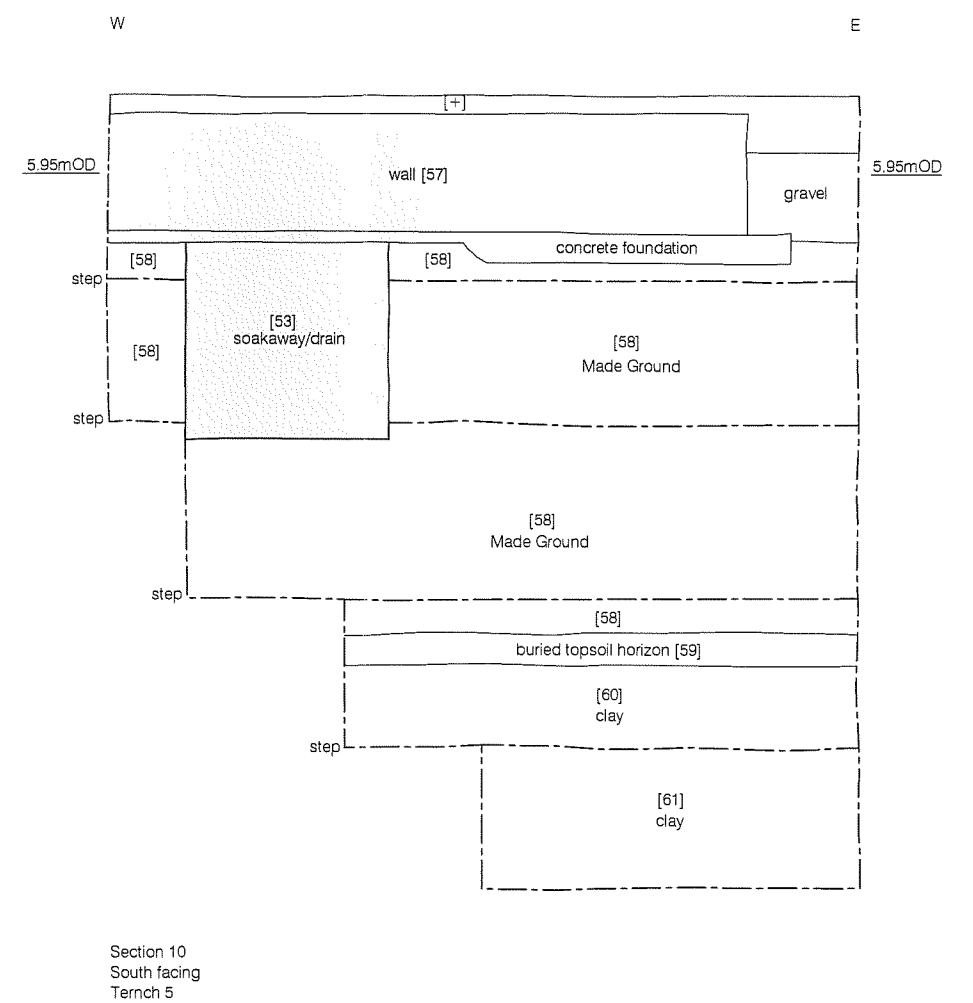
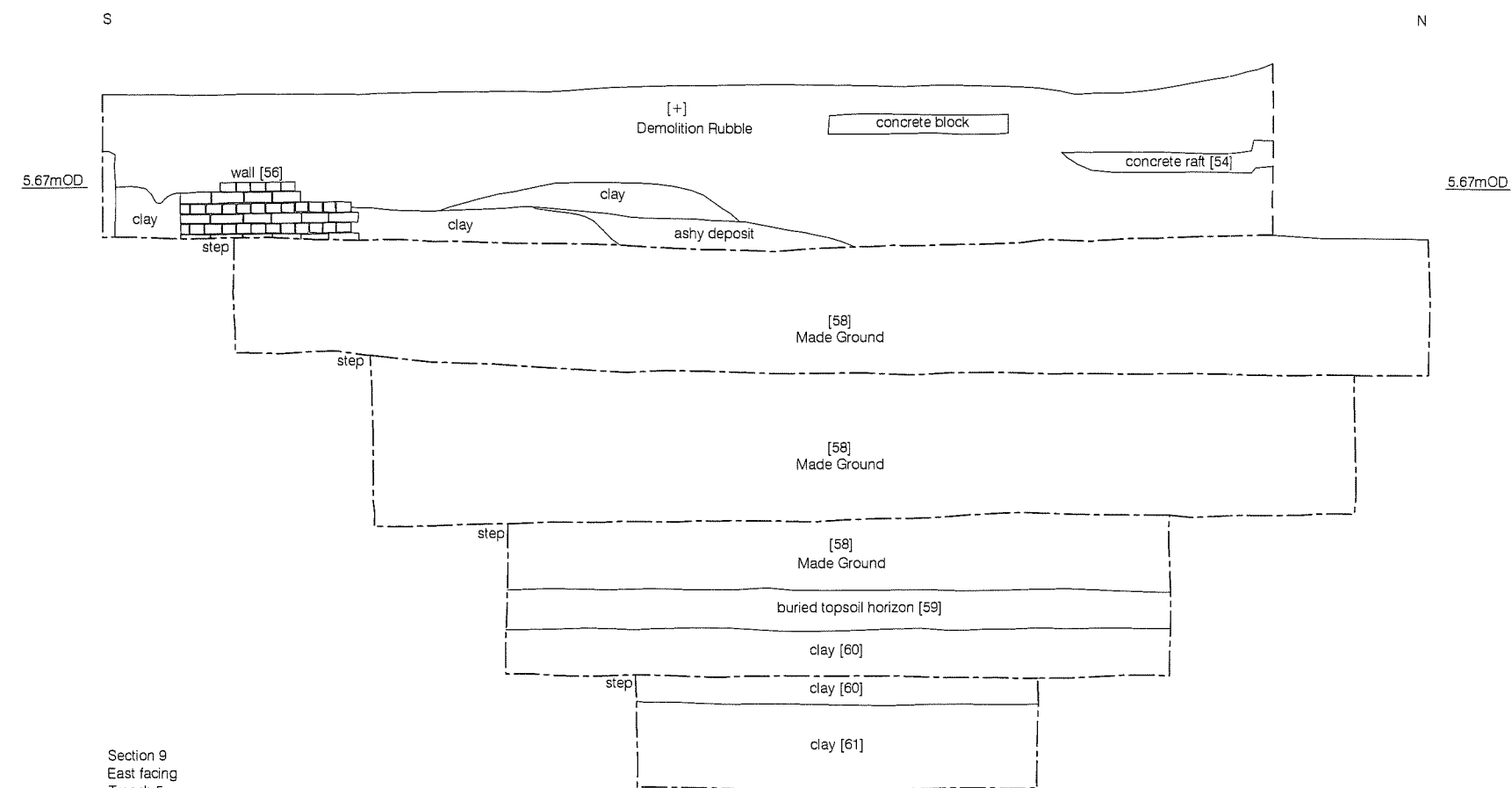
**Table 3:** natural sequence in west facing section trench 6

Coordinates 538367.2690, 184334.3930, +2.29					
East facing section in south west corner of trench 6 WWI07					
Unit	Depth from studied section (bgl)	Description	Interpretation and period	Monoliths	
c +2.29m OD					
Facies 6	0.00	Orange Fe stained and heavily concreted dumping.	early 20th century dumping	Tr6M3 +2.29 - 1.79m OD	
c +2.19m OD					
Facies 5 context 17	0.10	Soft dark grey/black ORGANIC CLAY. Soft light grey alluvial silty clay lense from 0.25-0.35. Frequent molluscs and macro-organic fragments. Lense with modern glass at 0.15	Organic clays possibly indicating ponding and a boggy, marshy environment, perhaps localised (similar to organic clays seen in trenches 1 and 5) and infilling clay pits or drainage channels		
c +1.89m OD					
Facies 1	0.40	Black well sorted medium SAND. Frequent rounded GRAVEL/pebbles (1-3 cm) along upper interface	River terrace gravels of Low Terrace. Deposited in the Late Devensian		
	c +1.79m OD				
	0.50 - 0.52	Coarse SAND and pebble-sized GRAVEL			
c +1.77m OD limit of excavation					

**Table 4:** organic deposit in south west end of trench 6

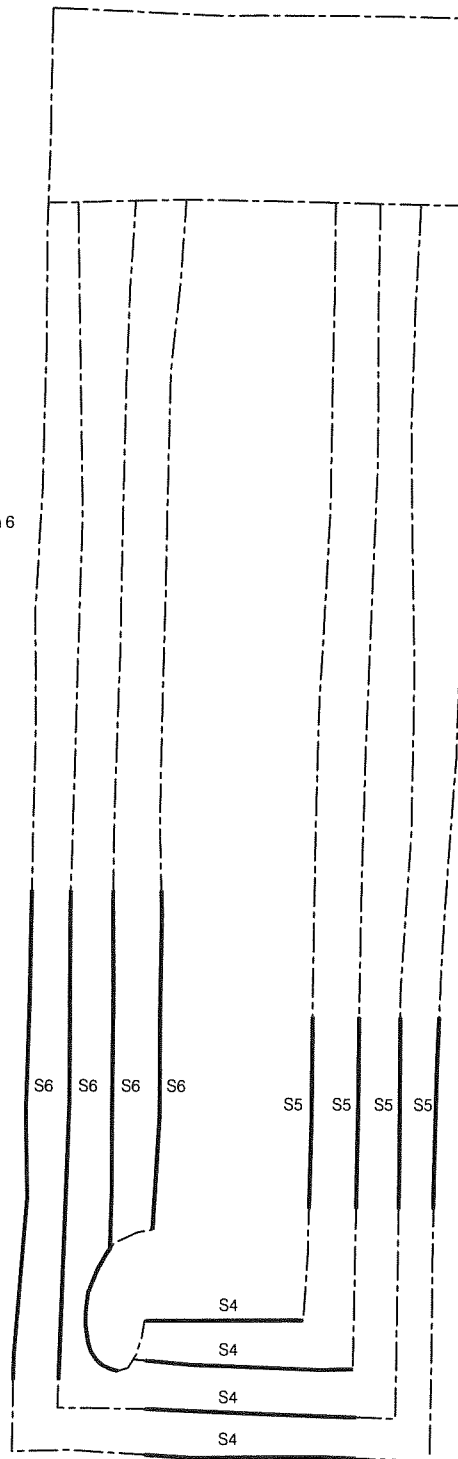


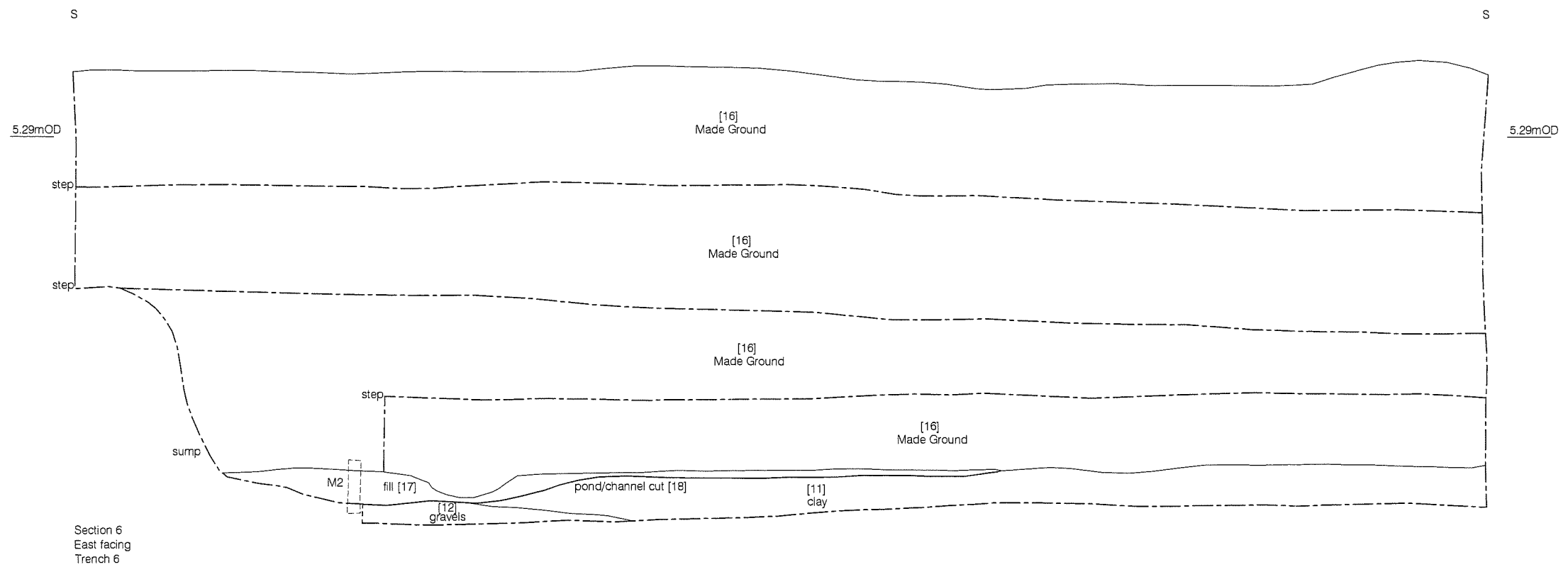
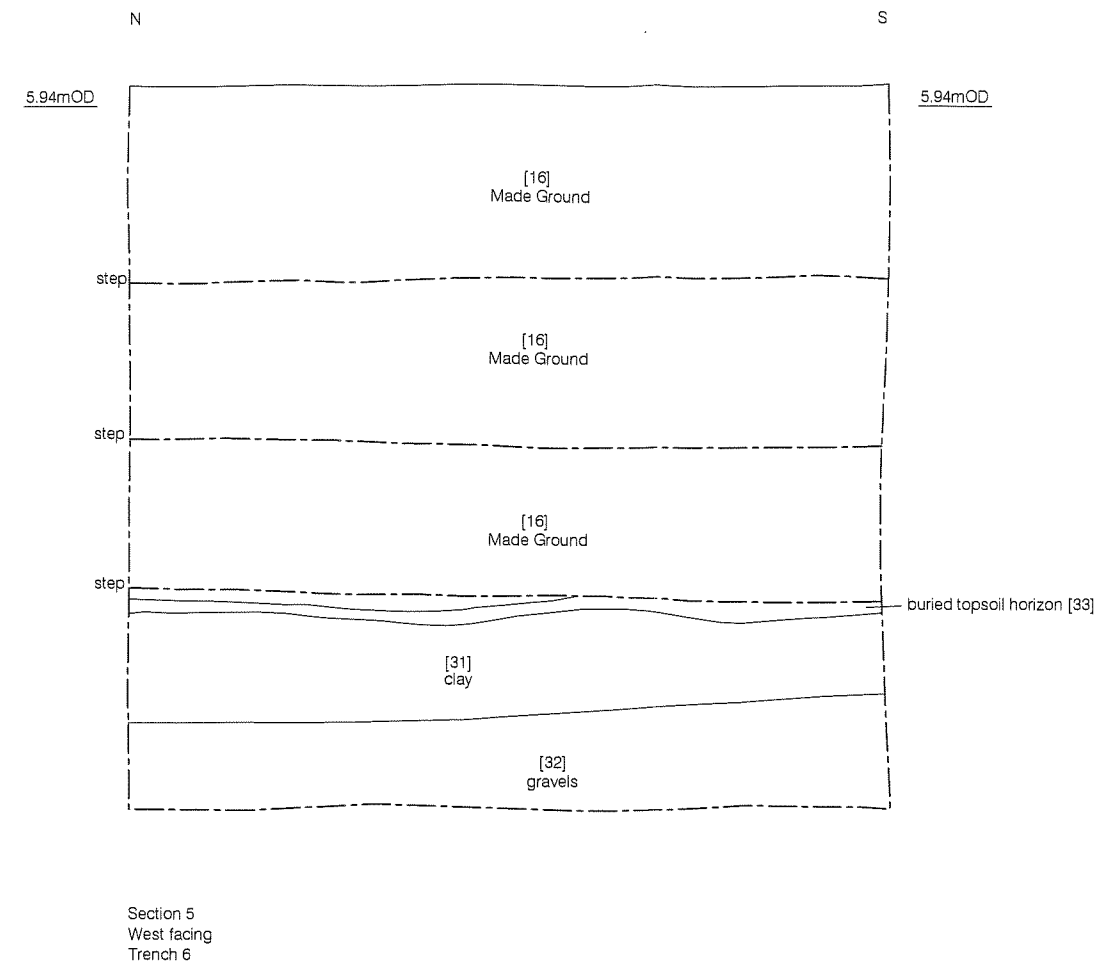
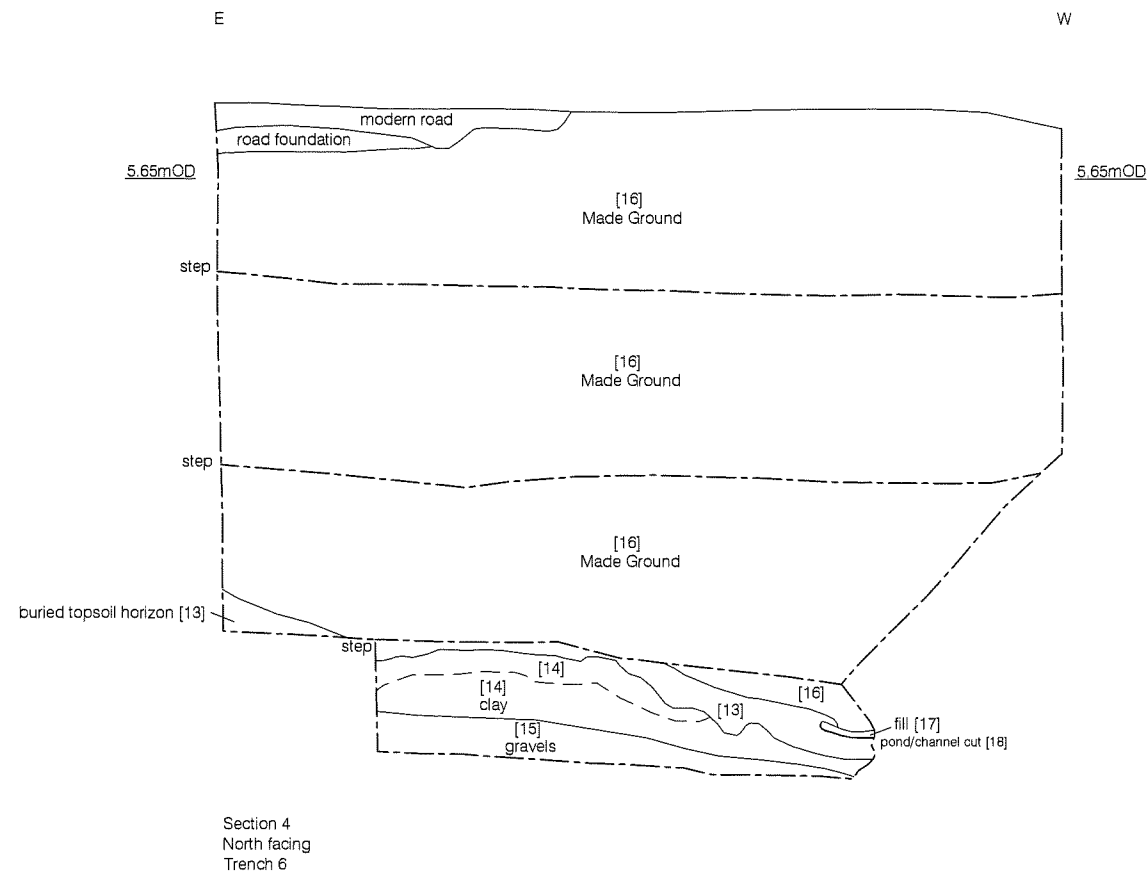
..... Detail from 1914 OS Map showing the outline of building adjacent to the Powerhouse





Trench 6







## 7 THE ARCHAEOLOGICAL SEQUENCE

- 7.1 Underlying the Holocene sedimentary sequence in all trenches lay floodplain gravels (facies 1, contexts [6], [12], [15], [32] and [62]). These were generally described as clast-supported mid-brown or greyish brown small to medium sub-rounded gravels in a coarse sandy matrix. Horizontal bedding was noted in areas of the trenches where gravels were exposed to a greater extent, but due to conditions on site (instability of trench sections and water ingress) full descriptions were not possible. The gravels in this part of the valley were probably deposited some time before the LGM as described above (3.4) and comprise Lea Valley Gravels (*sensu* Gibbard, 1994). The surface of gravels was recorded between approximately +1.50m and +2.00m OD with no significant topographic highs or lows. This is consistent with Lea Valley mapping project modelling of the pre-Holocene surface in the area (Burton et al, 2004). The low terrace, identified during this work, lies buried under floodplain alluvium extending from Stratford to Temple Mills and out into the main part of the Lea Valley floodplain. Recent work in the WWI07 area (at PWS06) suggested that the gravel surface rose to the south of the modern Channelsea. The gravel topography was fairly consistent at WWI07 with a rise in of only 0.40m from Trench 1 in the north to Trench 6 in the south. On the basis of the trenches observed during this evaluation therefore, it appears that prior to human manipulation the Channelsea River did not incise into the gravel terrace in this area.
- 7.2 Fining up from gravels, facies 2 (context [5] and [61]) appears to represent a gradual accumulation of fine-grained material on the floodplain during the Late Pleistocene. The sediments may have accumulated by alluvial deposition (as well as fluvial, aeolian and hillslope processes mobilised by freeze-thaw) and are weathered and oxidised due to exposure. These deposits are equivalent to the sandy clay of facies 2 observed at PWS06, GNF06 and OL-00305 (Nicholls, 2007; Eastbury and Nicholls, 2007 and Halsey and Hawkins, 2007).
- 7.3 These deposits have been preserved down the eastern side of the modern valley floor in the Stratford area, as they were not eroded by the downcutting that took place in the Late Glacial period, which appears to have taken place in the western part of the valley floor. As a result the low terrace remained raised from the active floodplain from the Late Glacial onwards and a dry landsurface existed on the low terrace, including the area of the Woolwich Line Enclosure. Although soil horizons are likely to have begun to form within the Pleistocene deposits of the low terrace during the Holocene, evidence for soil formation was not observed in the trenches. Archaeological finds and features were not found associated with the inferred landsurface, but prehistoric and Roman ditches are known to cut into these sediments elsewhere in the area, for example at OL-00305.
- 7.4 Alluvium overlay the Pleistocene fine-grained material (facies 3, contexts [5], [11], [14], [31] and [60]) above approximately +2.0m and +2.3m OD, dipping slightly towards the east of the site. This blue grey silty clay represents increased flooding and sediment carried onto the floodplain as river-levels rose. The flooding and increased sediment load of the river may be in part a result of impeded drainage caused by the encroachment of estuarine environments upstream. Increased amounts of sediment would have also been transported by the river system, as a result of destabilisation of soils and sediments, from prehistoric time, following forest clearance and other activity. The colour and mottling suggests prolonged flooding and intermittent drying out, with alluviation by the Lea or a tributary flowing into the valley to produce seasonally waterlogged meadow-like environments. Recent work in the area suggests alluvial deposition on the low terrace dates from the Roman period onwards.

- 7.5 A buried soil horizon was observed throughout the site (facies 4, contexts [4], [13], [33], and [59]) with a thin turf line noted in places. The gradational boundary between facies 3 and 4 suggests the soil formed within the upper horizon of the alluvium in the late post medieval period as pottery recovered dates to the 19th century. The deposit represents the occasionally waterlogged fields of the pre-industrial land surface. The soil may have developed as a result of drainage and management that took place from the 11th century onwards (Powell, 1973; Eastbury and Nicholls, 2007).
- 7.6 A discrete band of very black humic silty clay (facies 5) with abundant fibrous plant material, small mollusc shells, 19th century pottery, corroded metalwork and clinker was recorded at the margins of the modern Channelsea. This was interpreted as waterlogged and vegetation-rich sediment stagnating at the edge of a ditch or possibly a slow-flowing channel. The clear lower and upper boundaries indicate a manmade cut and modern truncation respectively. The manmade nature of the cut does negate the possibility that the Channelsea flowed here as a natural Holocene stream and suggests its modern course is artificial. A possible drainage ditch or pond identified in the southern half of the site ([17] and [18]) was also assigned to facies 5). This feature and the stake driven through the alluvium and Pleistocene fine-grained material in trench 1 are likely to relate to medieval and post medieval diversion, excavation and manipulation of channels for industrial and economic purposes such as to power mills, feed moats and provide transport. It is also possible that facies 5 represents the boggy fills of clay pits dug in historic times on the seasonally wet fields, scrub and grassland of the low terrace, which subsequently remained as ponds, gradually silting up.
- 7.7 This land surface has been levelled up from the 19th century onwards with domestic, industrial and general waste and dumps, in some places up to 4.00m thick: [2], [16], and [58]. The direction of slumping and orientation of cutting and dumping suggest the material has been tipped into a depression in the landscape in the area of the modern Channelsea. However, due to truncation, it is impossible to tell whether this depression relates to a natural feature.
- 7.8 Finally, within Trenches 3, 4, and 5 the demolished Powerhouse and ancillary buildings were recorded. The excavated archaeological evidence of two corridors in Trench 3 leading to a rhomboid brick structure in Trench 4 would confirm the interpretation set for them being a flue for bringing hot gases to a chimney and a flue bringing in (and at the same time heating) air to the main building (Westman and Dwyer, 2007).

## 8 POTENTIAL

- 8.1 The sediments observed at the base of the deeper excavations during the WWI07 evaluation were of geoarchaeological and palaeo-environmental interest, important in understanding the natural formation and change of the lower Lea Valley. The samples obtained from the trenches have the potential to provide evidence that will contribute to our understanding of the changing landscape of the lower Lea in which past human activity took place. The sampled sequences comprised profiles in Trenches 1, 5 and 6 from which monoliths were taken (see Table 1, Table 2 and Table 3) and bulk samples from organic-rich deposits were also collected. The geoarchaeological (archaeo-environmental) potential of the natural profile is summarised below.
- 8.1.1 *Facies 1 – Gravels and Facies 2 - Pleistocene fine-grained material.* The evaluation identified gravels across the site that represent Lea Valley gravels (*sensu* Gibbard, 1995) and form part of the low terrace. They are overlain by fine-grained material that may have accreted by various processes (such as alluvial, fluvial, aeolian and hillslope) during the latter stages of the Pleistocene and which has subsequently been exposed and weathered. These deposits are equivalent to facies 2 at PWS06 and OL-00305 (Nicholls, 2007 and Halsey and Hawkins, 2007). The fairly level topography of the gravel surface at WWI07, PWS06 and GNF06 (between +1.50 and +2.00m OD) and the presence of the fine-grained deposit in all the trenches examined, suggests that a natural Pleistocene tributary of the Lea did not exist along the course of the modern Channelsea, as there is no incision or erosion of gravels. It seems likely that the Channelsea was a manmade tributary of the Waterworks River.
- 8.1.2 The gravel characteristics could not be observed, however, as they were not penetrated to any depth. Recent work on other Stratford City sites (for example SZA07 and SZB07) has shown that the basal gravel across the site is likely to have accumulated during different stages of the Late Pleistocene and Holocene. This would have influenced the Mesolithic environment and it also has a bearing on our understanding of the changing Late Glacial and early Holocene environment of the Lower Lea. On future Stratford City sites it is recommended, wherever possible, that the trenches are excavated deep enough to record the gravel in more detail than was possible on WWI07.
- 8.1.3 The gravels and overlying fine grained sediment is thought to have been left high and dry following Late Devensian downcutting of the Lea and therefore has potential for prehistoric archaeology, although no features or finds were encountered during evaluation. Although soil horizons are likely to have begun to form within the older Pleistocene deposits, soil formation was not observed at WWI07. Archaeological finds and features were not encountered but prehistoric and Roman ditches are known to cut such deposits elsewhere in the area. Techniques such as loss on ignition and magnetic susceptibility might help identify whether a soil / landsurface existed in the fine-grained Pleistocene deposit (facies 2) overlying the gravels. This deposit also has potential to be compared with the prehistoric landsurface recorded elsewhere in Stratford City, where more obvious evidence for soil development within it has been observed. This will help in developing a reconstruction of the prehistoric topography and environment of the Stratford City site.
- 8.1.4 *Facies 3 - Holocene Alluvium.* The overlying sedimentary sequence represents the encroachment of wetter depositional environments and alluviation over the dry land of the low terrace. This blue grey silty clay represents an increase in flood events and sediment carried onto the floodplain. The general trend of rising river levels over the Holocene may in part be the result of impeded drainage caused by sediment entering the river

system. This is often attributed to soil erosion and destabilisation of the landscape by late prehistoric forest clearance and other human activity. The colour and mottling of the facies 3 sediments suggests prolonged flooding with alluviation from the Lea producing seasonally waterlogged meadows. Recent work in the area suggests alluvial deposition on the low terrace dates from the Roman period onwards. Although the weathered alluvial clay typically preserves little environmental evidence, there is potential for the alluvium to preserve environmental remains (such as pollen, diatoms, insects, seeds and snails) that might help reconstruct the environment of the low terrace when the alluviation took place. Such remains might also provide information about the relationship of the alluvium to the estuarine environments that had probably from medieval times onwards encroached into this part of the Lower Lea. Until the samples obtained from facies 3 are processed, the past environmental potential of the alluvium cannot be gauged.

- 8.1.5 *Facies 4 – medieval and post medieval soil.* A buried topsoil horizon with a thin turf line was recorded across the site, developing within the top of the alluvial clay as suggested by the gradational lower boundary. The deposit represents the pre-industrial land surface that probably comprised waterlogged fields. The soil may have developed as a result of drainage and management that took place from the 11th century onwards (Powell, 1973; Eastbury and Nicholls, 2007). Pollen and plant remains from this deposit might help reconstruct the floodplain environment immediately prior to Victorian goundraising and development.
  
- 8.1.6 *Facies 5 – Channelsea margins.* Black, vegetation-rich ditch deposits may have accumulated at the margins of the Channelsea following post medieval and Victorian cutting or re-cutting of the feature. This removed the soil at the edges of the channel and truncated the natural sediment sequence. Similar deposits, also attributed to facies 5, may also have infilled clay pits and / or drainage ditch features cut through the alluvial soil profile (facies 3 and 4). Snails were observed in the black organic clays of facies 5 and these deposits are also likely to preserve a wide range of other environmental remains, such as insects, plant remains and pollen. Given the likely later historic date for the facies and the features it fills, such environmental evidence could be extremely useful in charting the changing environment, vegetation and human activity within the floodplain in the historic period. Such information would be complimentary to evidence from historic maps and other documentary sources. In general little environmental evidence is available from the floodplain deposits from this period, which is usually represented by the weathered floodplain alluvium. The features filled with facies 5 provide a good opportunity to redress this lack of information.
  
- 8.1.7 *Facies 6 – made ground.* The upper part of the sequence comprised up to 4m of 19th century domestic, industrial and general waste dumping. It appeared the material had been tipped into a feature, now the modern Channelsea. There is no potential for further work on the made ground deposits.
  
- 8.1.8 *The demolished Powerhouse and ancillary buildings.* These buildings were recorded by standing buildings specialists and the evidence found below ground corresponds with the detailed above ground information described in the standing buildings report (Westman and Dwyer 2007).

## 9 CONCLUSIONS AND RECOMMENDATIONS

### 9.1 Summary

- 9.1.1 In conclusion, the evaluation revealed evidence for historic archaeology and potential for past environmental reconstruction.
- 9.1.2 Archaeological features of post medieval and 19<sup>th</sup> century date were found, which comprise the Powerhouse and ancillary buildings and an irrigation feature (drainage ditch) or/and clay pits cut to terrace gravels.
- 9.1.3 A soil horizon at approximately +3.00m OD, containing post medieval pottery, was identified across the site as the pre-Industrial land surface. This is buried by roughly 4.00m of dumped material.
- 9.1.4 At the margins of the Channelsea River the soil horizon is truncated at approximately +2.30m OD. A post medieval marshy ditch or pond fill indicates that the Channelsea feature was cut or cleaned out in recent time, possibly obscuring any archaeological evidence pertaining to the possible Saxon and early medieval history of the Channelsea. The overlying post medieval and 19<sup>th</sup> century material covering the area appears to tip into the Channelsea ditch.
- 9.1.5 It is suggested that the Channelsea is likely to be a manmade feature. This conclusion has been drawn on the basis of the consistent height of the gravel surface topography in the area, lacking low troughs that would indicate incision by a Pleistocene predecessor of the river. The covering of Pleistocene fine grained sediment across the gravels in every trench would also have been eroded if a natural watercourse had crossed this area in the Late Glacial or Early Holocene. Documentary evidence suggests the Channelsea is likely to have been cut during the medieval period as a mill stream, forming a tributary of the Waterworks River.
- 9.1.6 The sediments observed at the base of the trenches comprise an important geoarchaeological sedimentary archive. The profile is thought to span the Late Pleistocene, with a landsurface developing over the early and mid-Holocene followed by alluviation from Iron Age or Roman times. It remains a possibility that prehistoric features exist at the boundary between Pleistocene and Holocene deposits, cut into or discarded onto the landsurface and sealed by alluvium

### 9.2 Research aims

- 9.2.1 The extent to which the research aims (set out in 4.2) have been realised is summarised below.
- 9.2.2 *Does evidence for Mesolithic activity exist in the deposits recorded above Pleistocene gravel on the site?* Mesolithic activity was not encountered in the deposits recorded above Pleistocene gravel on the site during evaluation, but a landsurface that may have existed from the Mesolithic was identified.
- 9.2.3 *What are the characteristics of the gravel surface and overlying alluvium hitherto only observed in boreholes?* Horizontal bedding was described within the gravels of Trench 5, but in most cases it was not possible to observe characteristics due to water ingress. The gravel surface is recorded at a height consistent with that of the low terrace known to

exist in this part of the Lea and observed at other sites. The gravel was sealed by a Pleistocene fine-grained deposit in which a prehistoric land surface is likely to have developed. The overlying alluvium probably accumulated slowly and did not contain any datable artefacts, but on the basis of comparison with other sites it is likely to relate to the late prehistoric or early historic period.

- 9.2.4 *Does any environmental evidence suitable for past landscape reconstruction exist within deposits associated with ancient channels of the River Lea?* Deposits associated with natural, ancient channels of the River Lea were not identified. It is unlikely that such channels crossed the parts of the site evaluated. Ditch or channel deposits recognised suggest the presence of late historic, manmade watercourses or other historic cut features, such as clay pits. Environmental evidence suitable for past landscape reconstruction may be present within the alluvium, probably accumulated by seasonal overbank flooding of the river, and requires assessing as outlined below (9.3).
- 9.2.5 *Can episodes of channel activity be dated?* Although the alluvial layers are likely to date to the later prehistoric period and later, manmade cuts, possibly associated with the Channelsea or drainage ditches appear to have been in use as late as the post medieval to the 19th century.
- 9.2.6 *Is there evidence for an agricultural landscape in the post-prehistoric eras, and if so, how does it present itself? Is it possible to determine field boundaries and are they datable?* A buried soil and turf line indicates the pre-industrial land surface. Field boundaries were not identified during the evaluation.
- 9.2.7 *Are there any in situ deposits of archaeological significance within the made ground or is it all of 19th/20th century dump and make-up deposits?* There are no deposits of archaeological significance within the made ground.

### **9.3 Recommendations**

- 9.3.1 Four sequences have been sampled using monoliths (Table 5). Deposits sampled include the natural sequence above gravels, post medieval soil horizon, marshy Channelsea ditch deposits and post medieval drainage ditch feature (facies 2 to 4 and facies 2, 3 and 5).
- 9.3.2 The monoliths and associated bulk samples will be retained until environmental assessment is undertaken. It is recommended that assessment should include detailed descriptions of the sediments in the monolith tins by a geoarchaeologist and sub-sampling for pollen and diatoms. The sub-samples should be examined to determine the potential of these techniques for past environment reconstruction.
- 9.3.3 Subsequent analysis of the microfossil content of these sediments may enable revision of the sediment-based interpretations outlined in this document and might contribute new information to the body of geoarchaeological and archaeological work already carried out in the Stratford area.
- 9.3.4 Bulk samples taken predominantly for assessment of plant macrofossils, insects and snail fauna from the Channelsea ditch deposit require processing. Half of each bulk sample will require processing and scanning by MoLAS-PCA environmental specialists to ascertain the level of assessment necessary.
- 9.3.5 Processing will involve wet sieving through a 0.25mm mesh of half of each sample, specifically for the recovery of snails and flotation of the remainder. The alluvial clay

deposits will require soaking overnight in Calgon, to disaggregate the clay particles prior to processing.

Samples for processing and assessment					
Trench number	Monolith number	Sample number	Contexts	Height of top (m OD)	Bulk samples (context)
1	1	1	3	2.58	3 (3)
	2	2	5	2.12	
5	1	10	59, 60	2.45	
	2	11	60, 61	2.37	
	3	12	61, 62	1.95	
6	1	5	16, 33	2.53	4 (17)
	2	6	11, 14, 31	2.07	
	3	8	16, 17	2.29	

Table 5: **monolith and bulk samples that require processing**

- 9.4 Samples for radiocarbon dating should be submitted from the organic deposits of facies 5 in Trench 1, 5 and 6, as these deposits contained no cultural finds suitable for dating.
- 9.5 The results of the trench evaluation should also be added to the MoLAS-PCA geoarchaeological database for the Lower Lea. This will assist in pinpointing the trench locations within the past landscape and enable a more reliable assessment of the potential of the environmental evidence to be made.
- 9.6 The decision on whether the further work recommended above needs to be undertaken, as archaeo-environmental mitigation rests with GLAAS/EH.

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## APPENDIX 1: LIST OF CONTEXTS

Context No	Trench No	Description
1	1	Modern topsoil
2	1	19th - 20th century dumps
3	1	Pre-19th century riverside deposits
4	1	Pre-19th century buried topsoil
5	1	Gleyed alluvial clay
6	1	Natural clayey gravelly sand
7	1	19th century beam
8	1	19th century stake
9	1	19th century fence rail
10	1	Driven stake
11	6	Mid greyish orange silty clay
12	6	Natural clayey gravelly sand
13	6	Pre-19th century buried topsoil
14	6	Greyish brown and orange clay silt
15	6	Natural clayey gravelly sand
16	6	19th - 20th century dumps
17	6	Silty clay pond snail rich fill to 18
18	6	Cut of pond or channel
19	3	Demolition infill
20	3	E-W wall
21	3	E-W wall (truncated)
22	3	E-W brick flue
23	3	Rebuild or capping to 22
24	3	Concrete floor
25	3	Concrete floor
26	3	E-W wall and footing
27	3	E-W drain
28	3	Demolition infill
29	3	Ashy infill (sealed by 19)
30	3	Charcoal sooting and smudging on 22
31	6	Same as 11 and 14
32	6	Same as 12 and 15
33	6	Same as 13
34	4	E-W wall
35	4	Iron stanchion
36	4	Vertically set timber
37	4	Concrete floor

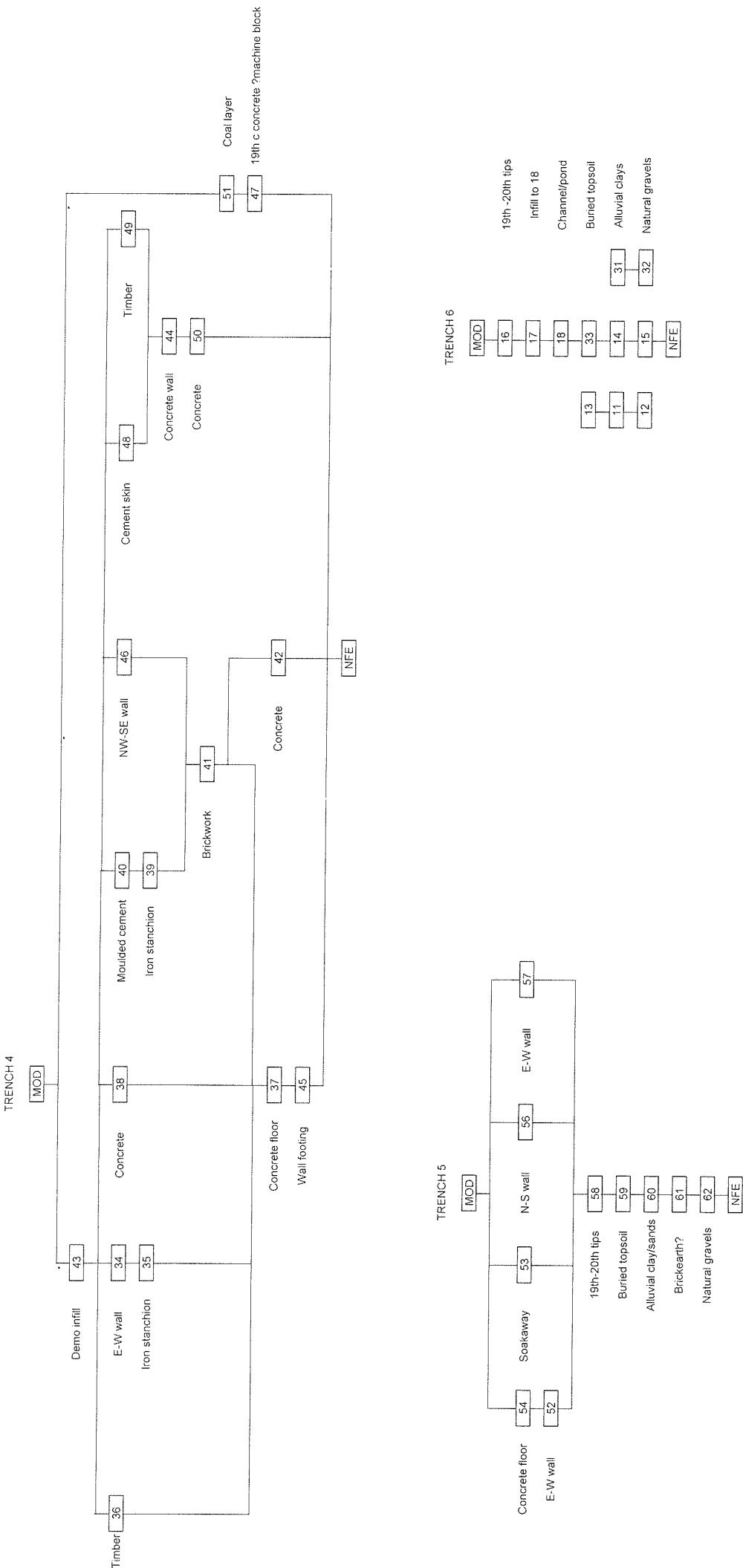
Context No	Trench No	Description
38	4	Mortar footing
39	4	Iron stanchion and bar
40	4	Moulded mortar
41	4	Yellow frogged brickwork
42	4	Concrete footing
43	4	Demolition and coal dust infill
44	4	Shuttered concrete wall
45	4	E-W brick and concrete footing (truncated)
46	4	NW -SE wall jointed to 41
47	4	Concrete machine block
48	4	Cement skim to 44
49	4	Halved vertically set timber
50	4	Concrete footing
51	4	Layer of compacted coal
52	5	E-W wall and stepped foundation
53	5	Brick lined soakaway
54	5	Concrete floor
55	5	Cross walls to 52
56	5	N-S wall in S.9
57	5	E-W wall in S.10
58	5	19th-20th century dumps
59	5	Pre-19th century buried topsoil
60	5	Bluish grey clayey sandy silts
61	5	Brownish yellow clay silt
62	5	Natural clayey gravelly sand

Link:

E:\CAD4\user\Will\eval\WWI07\WWI 07\clist.xls

## APPENDIX 2: SITE MATRICES

TRENCHES 4, 5 & 6 MATRICES



## APPENDIX 3: OASIS DATA COLLECTION FORM

### OASIS DATA COLLECTION FORM: England

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OASIS ID: preconst1-36972

#### Project details

Project name Woolwich Line Enclosure and Powerhouse Site

Short description of the project Archaeological evaluation

Project dates Start: 23-07-2007 End: 14-09-2007

Previous/future work Yes / No

Any associated project reference codes WWI 07 - Sitecode

Any associated project reference codes GNF 06 - Sitecode

Type of project Field evaluation

Current Land use Industry and Commerce 1 - Industrial

Monument type POWER STATION Modern

Significant Finds BUILDING REMAINS Modern

Methods & techniques 'Sample Trenches','Targeted Trenches'

Development type	Rail links/railway-related infrastructure (including Channel Tunnel)
Prompt	Planning condition
Position in the planning process	After full determination (eg. As a condition)
Project location	
Country	England
Site location	GREATER LONDON NEWHAM STRATFORD Woolwich Line Enclosure and Powerhouse Site
Postcode	E15
Study area	9000.00 Square metres
Site coordinates	TQ 3835 8441 51.5411112745 -0.00477072236111 51 32 28 N 000 00 17 W Point
Height OD	Min: 13.14m Max: 15.25m
Project creators	
Name of Organisation	Arups
Project brief originator	Greater London Archaeological Advisory Service
Project design originator	Suzanna Pembroke
Project director/manager	Peter Moore
Project supervisor	William Johnston
Type of sponsor/funding body	Geotechnical contractors



Name of sponsor/funding body Norwest Holst

#### Project archives

Physical Archive recipient LAARC

Physical Contents 'Ceramics'

Digital Archive recipient LAARC

Digital Contents 'Stratigraphic','Survey'

Digital Media available 'Survey','Text'

Paper Archive recipient LAARC

Paper Contents 'Stratigraphic'

Paper Media available 'Photograph','Plan','Report'

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