Beckton Gasworks
Sub-surface Deposit Model

Geo-archaeological Assessment Report

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BECKTON GAS WORKS,
LONDON BOROUGH OF NEWHAM

GEOARCHAEOLOGICAL ASSESSMENT REPORT

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SUMMARY

In September 2004 Oxford Archaeology (OA) was commissioned by CgMs Consulting to undertake a geoarchaeological assessment at the former site of Beckton Gasworks. The primary objective of the assessment was the creation of a deposit model for the area, based on borehole and testpit records, in order to provide baseline data regarding the subsurface stratigraphy and ultimately the archaeological potential of the site.

The model demonstrated that significant thicknesses of undisturbed Holocene alluvial and peat deposits exist throughout the site, sealed beneath extensive deposits of made-ground. The earliest deposits within the sediment sequence, directly overlying the basal Pleistocene gravels, may date to some time in the early Holocene when the floodplain area would have been relatively dry. The majority of the deposits however are likely to date from the late Mesolithic period and later and are associated with the gradual development of wetland environments as a consequence of rising water tables and subsequent estuarine flooding.

The major stratigraphic units identified conform, on a superficial level, to the regional sequences of the Lower Thames outlined by previous work. Closer examination however revealed significant local variations representative of a range of depositional environments existing at any one time. In some areas these variations are clearly associated with topographic features that were subsequently buried by later alluviation and are no longer visible. Undulations within the basal gravel topography revealed a significant area of high ground within the central part of the site that may have existed as a series of islands within a predominantly wetland environment from the late Mesolithic period onwards. Inundation and burial of these areas is likely to have occurred perhaps some time in the mid 2nd millennium BC. Two potential palaeochannels were also identified. One of these may represent a buried tributary of the Thames associated with the drainage system of the River Roding. The other is likely to represent an abandoned former course of the main Thames channel.

The range of the depositional environments represented at the site have varying potential for the preservation of archaeological and palaeoenvironmental remains. Previous investigations on the floodplain have shown that evidence of human activity has been found in association with the margins of channels and at the wetland/dryland interface. As such these locations are considered to represent significant areas of archaeological potential.

INTRODUCTION

1.1.1 In September 2004 Oxford Archaeology (OA) was commissioned by CgMs Consulting to undertake a geoarchaeological assessment of borehole records from the site of the former Beckton Gasworks in the London borough of Newham. This work was undertaken in order to provided base-line data regarding the character and archaeological potential of the sub-surface stratigraphy.

1.1.2 The main objective of the assessment was to create a deposit model specific to the site. This model builds on the results of a previous model proposed for the region as part of an Environmental Impact Assessment (EIA) carried out in advance of construction for the London Gateway Bridge between Newham and Woolwich (OA 2004).

1.1.3 Subsurface deposit modelling has the ability to reconstruct past geographies (palaeogeographies) for areas where the surface expression bears little or no relationship to those buried at depth. This type of approach is particularly valuable in floodplain environments where the archaeological potential is difficult to assess by traditional methods. In the Lower Thames this is often due to thick deposits of made-ground and estuarine alluvium effectively masking earlier deposits that frequently lie at great depth.

1.2 Geology and topography

1.2.1 The site is located on the north bank of the River Thames, approximately 1km to the east of Beckton town centre (TQ 443814), on the site of the former Beckton Gasworks (fig. 1). The southeast sector of site was occupied by structures associated with coal and coke handling, such as stacking plants, oil plants, lobbies and offices. The western sector comprises the remains of the concrete foundations of conveyor systems, tunnels and laboratories.

1.2.2 The site lies on the floodplain of the River Thames. The river flows immediately along the southern boundary of the site, and Barking Creek, a north- south tributary of the Thames, is located to the east. At this point on the river the distance between higher ground of the gravel terrace to the north and the main Thames channel is approximately 2km. Modern ground levels across the site average between +3.0m and +6.3m OD. The underlying geology is Upper Chalk overlain by tertiary deposits, predominately Thanet beds (BGS sheet 257). Quaternary deposits consist of Pleistocene river gravels overlain by Holocene alluvial silts and clays. The sequence is capped by varying thicknesses of made ground.

1.3 Geoarchaeological background

1.3.1 In order to understand fully the character and distribution of likely archaeological sites in the lower estuary area and the reasons behind major changes in settlement patterns in the past it is necessary to understand the changing nature of the estuary. The geological history of the Thames is complex. Today the estuary is characterised as “tide-dominated” (Dalrymple *et al*., 1992) in which major sandbars occur within the outer estuary area, a marine-dominated zone, and tidal meanders in an inner mixed energy zone (Bates and Whittaker 2004). Beckton Gasworks lies within the inner part of the estuary.

1.3.2 The Pleistocene deposits of the Lower Thames have been extensively studied (Gibbard 1985, 1994, Bridgland 1994). Deposition in the Thames Valley began in the late Anglian stage (circa 500,000 B.P.) and continued intermittently throughout the Pleistocene. Sediments, deposited in cold climate braided steam systems, exist as wedges of sand and gravel on the valley sides, subsequently eroded by fluvial incision during periods of lowered sea level to create terraces. The most recent episodes of gravel deposition formed the Shepperton gravels in the valley bottom. Despite the extensive research on the Pleistocene deposits however, considerable controversy exists regarding the age of the older aggradational units and their correlation with the global oxygen isotope stratigraphy (Gibbard 1994, Bridgland 1994).

1.3.3 The surface of the valley bottom gravels form the 'template' onto which alluvial and estuarine sedimentation occurred during the Holocene. In contrast to the relatively well known sequences of the Pleistocene, the nature of the Holocene sediments deposited during the last 12,000 years are not well understood and have only, with few exceptions, been described superficially (Bates 1998, Bates et al 2000, 2004). The landscape during this period saw a number of changes, largely attributed to a rise in sea-level caused by the continued shrinking of the polar ice caps and tectonic subsidence. The Holocene sediments form a wedge thickening downstream, from less than 2m at Tower Bridge to a maximum thickness of 35m east of the study area at Canvey Island (Marsland, 1986).

1.3.4 Within the inner estuary Holocene sediments consist of complex sequences of minerogenic and organic clay, silts, sands and peats, deposited in a variety of environments representing variously alder carr, fen, reedswamp, intertidal saltmarsh and mudflats. The currently adopted stratigraphic sequence for the Lower Thames is based on work undertaken by Devoy (1977, 1979, 1982). Borehole stratigraphies were integrated with biostratigraphic studies to infer successive phases of marine transgressions (Thames 1-V) represented by clay/silt units and regressions (Tilbury 1-V) represented by peat units. Devoy constructed two age-altitude curves of relative sea level movement, one for Tilbury (outer estuary) and one for Crossness, Dartford and Broadness (inner estuary). The model suggests transgressions occurred in the Palaeolithic/early Mesolithic periods, the late Mesolithic/early Neolithic periods, throughout the Bronze Age, in the middle Iron Age and at the beginning of the 4th century AD (Devoy 1980).

1.3.5 The 'Thames-Tilbury' model is regarded as the seminal work in this area (Haggart 1995) and has been widely applied by researchers outside the original study area in the absence of regional models. However, recent work (Haggart 1995 in Sidell et al 2000:16) has highlighted several problems, such as the need for two age/ altitude curves, suggesting it cannot always be easily applied to the whole of the Thames Estuary, both in terms of lithology and age/ altitude analysis. (Sidell et al 2000:16).

This reflects the complex nature of the floodplain environment during this period, consisting of peat forming communities, migrating channels and sand eyots (Sidell 1998). Bates (1998,1999, 2000, 2004) points out that Devoy's work has resulted in a view of sediment accumulation being controlled within the area by a combination of factors dominated by sea-level change and tectonic depression, taking no account of palaeogeography, sedimentary basin size and local to regional sedimentation patterns. More recent work has been aimed at constructing regional models for estuary development (Long 1995, Long *et al* 2000) which begin to address the range of factors responsible for sequence accumulation. These studies focus on detecting contrasting zones, where the archaeological significance depends upon the position of the wetland-dryland interface, or identifying between channels, peatlands and siltlands. Such areas are considered to be the foci of human activity and a key to identifying areas of high archaeological potential. A summary of the most recent model proposed by Bates and Whittaker (2004) is included in Appendix 2.

1.3.6 In March 2004 OA carried out a detailed Environmental Impact Assessment of the cultural heritage implications of the construction of a major new bridge, crossing from Newham to Woolwich (the Thames Gateway Bridge). A component of the assessment was the production of a sub-surface deposit model based on historical borehole records. The results of the model were used as a framework within which the subsurface topography and human environment of the development area could be understood. This provided the basis to model development impacts and mitigation strategies. The report, prepared for OA by Dr. M. Bates, identified a potential palaeochannel sequence that may have formed part of a small tributary of the Thames. This tributary appears to have flowed south from Barking, before veering eastwards at Beckton, and crossing the southwestern sector of Beckton Gasworks before issuing in to the Thames (fig.9). The confluence of this tributary and the Thames was considered to be a significant area of localised geomorphology and of high archaeological potential (OA 2004).

1.4 Archaeological background

1.4.1 The evidence of the Palaeolithic and Mesolithic periods is largely confined to isolated find spots within the Lower Thames floodplain. Palaeolithic hand axes have been found at a number of sites including Barking Creek, near Uphall, on Ripple Road, Gale Street, Five Elms and Beacontree Heath (MoLAS 2000). These finds are invariably associated with the Pleistocene river gravels and are usually considered to be redeposited from their original locations by fluvial processes.

1.4.2 Evidence from later prehistoric occupation is more extensive. In the past Neolithic and Bronze Age occupation was thought to be largely confined to the gravel terrace. The vast majority of sites that were identified through crop marks and excavations were located on the terrace. This led to the wide held belief that the floodplain was only marginally utilised in the past. This was partly a bias that came out of developer-funded archaeology and partly traditional perceptions of floodplain archaeology. It is now being realised through greater investigation of the Thames floodplain that many of these areas were seasonally if not permanently utilised during drier periods. More recent discoveries have revealed that archaeology is commonly associated with interface zone between the wetland floodplain and the drier margins. Trackways have been identified at the margins of the terrace edge running onto the low-lying wetlands, possibly linking islands of drier ground within the floodplain. They have been discovered at numerous locations, both north and south of the river. In the vicinity of the site, Bronze Age wooden trackways have been identified at Beckton Nursery and the Beckton '3D' site (Meddens 1996), approximately 2.3 km to the northeast, and at the Tesco and London Road sites in Barking, 2.5km to the north (ibid.). Similar finds have been identified more recently during the A13 road improvements at Movers Lane and Woolwich Manor Way (Gifford and Partners, 2000, 2001a, 2001b). At the Hayes Storage site in Dagenham, 4km to the northeast, excavations identified a linear feature interpreted as a causeway. This causeway was 4.00m wide and 0.27m deep, constructed from pebbles, sandy silts and burnt flint, located within peat deposits (Divers 1994, Meddens 1996). Radiocarbon dating of the peat immediately overlying the causeway provided a date of 2960±-80 B.P.

1.4.3 All of these structures appear to be associated with peat deposits and tend to cluster at the edge of the higher ground of the gravel terraces. Further out onto the floodplain towards the river finds of this nature are much rarer. This may be due to later erosion as a result of the main Thames channel shifting its course through time. Alternatively, and more likely, it is due to poor visibility. Important prehistoric remains may lie deeply buried beneath thick deposits of alluvium in these locations. Approximately 2.5km to the west at Fort Street, Silvertown, a wooden structure, interpreted as a trackway, was identified within 100m of the main Thames channel. The structure, dated to the 2700BC (4280±50 B.P.), was associated with an elevated sand ridge, overlain by peat deposits containing abundant potsherds of Bronze Age date (Meddens 1996, Wessex Archaeology 1994).

1.4.4 The gravel terraces of the Lower Thames are known to have been intensively settled in the later Iron Age and Roman periods with the development of London as a major provincial capital (Wilkinson 1988). Since the redevelopment of London in the 1970's access to the Roman and medieval waterfronts have been possible, revealing changing exploitation and economies of the floodplain. The gravel terraces were still the main focus for the occupation, however it is possible that the first elements of marshland draining process may have begun during this period. Significant changes in this period include the growth of salt-making as an important activity along the estuarine and coastal margins. There is also extensive evidence for Roman cemeteries and settlement at Barking, and an Iron Age defended settlement at Uphall (MoLAS 2000).

1.4.5 The historic character of the marshland of the lower Thames has largely disappeared through land reclamation and recent development. Barking appears to have developed as a local centre during the Anglo-Saxon period in 666AD with the establishment of an Abbey. During the medieval period the Barking marshes, which were prone to flooding, were widely used for fishing, fowling, reed growing and tanning. There are references of floods, marshland management and river defences throughout the medieval period, although more systematic reclamation was undertaken from the 16th and 17th centuries.

1.4.6 The majority of the marshland landscape we see today was created during the later medieval period (AD1066 to 1550), when the major phases of marshland reclamation and sea defence construction seems to have begun. Most of the present building on the floodplain consists of 20th century industrial buildings

2 AIMS

2.1.1 In order to provide base-line data regarding the subsurface stratigraphy, the overall objective of the assessment was to develop a deposit model specific to the site. This model builds upon a previous model created for the region as part of an EIA prior to the construction of the London Gateway Bridge (OA 2004). Specifically the model aimed to:

2.1.2 Characterise the sequence of sediments and patterns of accumulation across site, including the depth and lateral extent of major stratigraphic units, and the character of any basal land surface pre-dating these sediments.

2.1.3 Identify significant variations in the deposit sequence indicative of localised features such as topographic highs or palaeochannels.

2.1.4 Identify the location and extent of any waterlogged organic deposits and address the potential and likely location for the preservation of archaeological and palaeoenvironmental remains.

2.1.5 Clarify the relationships between sediment sequences and other deposit types, including periods of 'soil' or peat growth, and the effects of relatively recent human disturbance, including the location and extent of made-ground.

2.1.6 Relate the site sequences to current regional models proposed for the Lower Thames system.

3 METHODOLOGY

3.1.1 In order to create the deposit model 24 borehole and 130 test pit logs were examined The logs derive from a geotechnical ground investigation undertaken by WSP Environmental Ltd (2003). Added to this were 195 historical boreholes located within and up to 100m beyond the site (fig. 1). These boreholes derive from various ground investigations carried out in the area, the records of which are held at the British Geological Survey (BGS) in Keyworth.

3.1.2 The lithological data from the logs was inputted into geological modelling software (©Rockworks 2004, ©Surfer 8) for analysis and correlation of deposits into key stratigraphical units. These units have been used to demonstrate the nature and the extent of sediment accumulation patterns across the site. Various cross sections and elevation plots have been produced in order to illustrate the main points of discussion.

3.1.3 No core or sample data was available during the project to verify any of the observations made in this report. All information comprised paper copies of boreholes and test pits records and consequently a range of problems may exist with this type of data set (Bates et al, 2000).

RESULTS: STRATIGRAPHICAL SUMMARY

4.1.1 The evidence from the boreholes and test pits revealed that a range of different sediment types are present throughout the site. A number of commonly occurring stratigraphic units have been identified as follows (in order of deposition),

- **Made Ground**
- **Alluvium III**
- **Peat II**
- **Alluvium II**
- **Peat I**
- **Alluvium I**
- **Gravel**
- **Bedrock**

4.1.2 Firm assignment of individual lithologies to particular stratigraphic units has proved difficult at some locations, particularly in the lower parts of the sequence resting upon the basal gravels. This is due to the fact that different units of alluvium may often only be distinguished when intercalated peat deposits occur. Correlation of stratigraphic units also assumes a broad horizontal pattern of accumulation.

4.1.3 **Bedrock.** The bedrock across the site varies and includes Upper Chalk and Thanet beds. The vast majority of test pit and boreholes did not penetrate the base of the Pleistocene gravels. Those that did however provided elevations of between -17.3 and -1.68 m OD.

4.1.4 **Gravel.** Gravels and sandy gravels appear to extend across the whole site overlying bedrock and in most locations sealed by later Holocene deposits (figs.2-3). The base of the gravels was not always reached. Where bedrock was proven however the gravels appeared to vary substantially in thickness from 1m to 9m. The coarse grained character of the deposits suggests accumulation under cold climate periglacial conditions within high energy braided streams. Thin layers of soft clay were some times noted in the logs and may represent organic infilling of eroded palaeochannels. On the basis of previous work (Gibbard 1994, Bridgland 1994) these deposits can be equated with the Shepperton terrace gravels dated to 10-15ka BP. Any archaeological remains identified within these deposits are likely to be reworked by fluvial processes.

4.1.5 The elevation data from the surface of the gravels has been used to create a topographic map (fig. 2). This modelled surface varies greatly from +1.2 to -10.4m OD. The shape of this surface essentially defines the topography of the early Holocene landscape. Bates (1998) refers to this as the 'topographic template' and suggests that variations in the template largely dictated the patterns of subsequent landscape evolution as flooding ensued during the later prehistoric period.

4.1.6 The lowest elevations between -10.4 and -6.4m OD, as to be expected, generally coincide with the location of the modern River Thames. Elevations however between -6.4 and -5.2 appear to form linear depressions. The first of these, in the southwest sector of the site, aligned east-west, may represent the location of a palaeochannel (palaeochannel A, fig.3). This coincides with the palaeochannel previously identified in the London Gateway model (OA 2004). The second depression lies to the northwest. The alignment however appears to follow that of the modern River Thames. This feature may well represent an abandoned meander of the river, which at some point appears to have shifted southwards slightly to its present position (palaeochannel B, Fig. 3).

4.1.7 For a large area of the rest of the site the surface of the gravels average between -4.4 and -3.2m OD. Topographic highs however exist in the central area. The gross morphology in this area varies substantially indicating complex local variations that can not be wholly defined within the current dataset. Two clear areas of higher ground are noted to the south. The westernmost high point reaches elevations of approximately 0.0m OD, the easternmost slightly lower at between -0.8 and -0.4m OD. The elevated area immediately to the north indicates a possible third topographic high reaching heights of up to -1.2m OD. This area however has been interpolated on the basis of only one borehole record and is therefore less defined.

4.1.8 **Alluvium I.** This unit (fig.7) was only identified with certainty where it underlies Peat I (boreholes BEKBH13, TQ48SW 1001,397,683,684,686,699,715,938). It is of limited distribution, occurring sporadically in the southern sector of the site associated with low-lying areas and palaeochannels. It is generally described as a minerogenic bluish grey silty-clay ranging from 0.3-2.4m in thickness. The base of this deposit generally lies at elevations between -7 and -5m OD. This is the first evidence of Holocene alluviation occurring onto the topographic template. The fine-grained nature of the deposits represents fairly low energy deposition. These deposits may be representative of initial channel infilling in the early Holocene (Stages 1b or 2, Appendix 2). Any archaeological material present within these deposits may have been subjects to some level of reworking, although some of this material may only have suffered low level lateral transport.

4.1.9 **Peat I.** These deposits varied from friable peats to peaty clays containing various amounts of plant and woody material. Deposits are localised and confined largely to the margins of palaeochannel A (fig. 7, boreholes BEKBH 10, 13, TQ48SW1001, 397, 403, 405, 406, 683, 684, 686, 699, 703, 712, 715, 723, 933, 938). The peats varied from 0.15 to 3.20m in thickness, between -6.0, and as much as +2.44 m OD depending on its position on the topographic template. The presence of these peats suggests a phase of alder carr or reed swamp development. Any associated archaeological material is likely to have suffered little modification in terms of lateral transport.

4.1.10 **Alluvium II.** These deposits (figs. 6-8) are much more extensive, occurring at 68 locations. They vary from clay-silts to silts and sands. They range in thickness between 4.7 and 0.1m, though average approximately 1.5m. The elevation of the base of this deposit ranges between -0.48 and -7.11 m OD, and the top between +1.58 and -5.5m OD. Various amounts of organic content are also present including roots, organic clays and localised pockets of peat. Variations in lithology and organic content suggests that these deposits may be representative of a range of environments extending across the site. The generally fine nature of the sediments suggests fairly low energy deposition. Any archaeological material present within these deposits may have suffered low-level lateral movement, though a higher level of reworking is to be expected in the sandier deposits possibly representing deposition in small channels dissecting the floodplain.

4.1.11 **Peat II.** This peat is described as fibrous, clayey, and occasionally sandy. These descriptions again suggest a range of depositional environments are represented. The distribution and thickness of Peat II across site is illustrated in figs. 5-8. The basal elevations of this unit frequently lie at -5 m to -7m OD, forming a blanket spread over much of the lower lying topography. Its thickness ranges from 0.1m to 5.5m, but averaging approximately 1.70m. The more organic parts of the sequence may be representative of wetland environments such as reed swamp. Other parts of the sequence may indicate periodic flooding from active channels. Any archaeological material associated with these deposits is likely to have minimal modification in terms of lateral transport, though again a higher degree of reworking may be present in channel locations.

4.1.12 **Alluvium III.** These deposits consist of clay-silts with evidence of root action and weathering of the upper surface (figs.6-8). The deposits extend across the entire site and thickness ranged from 0.1m to as much as 8m. The average however was approximately 2.5m. These deposits represent the most recent episode of sedimentation associated with the Thames floodplain. The fine-grained nature of these deposits indicates low energy deposition. Any archaeological material present within these deposits may have suffered low level lateral movement.

4.1.13 **Made ground.** Extensive deposits of made ground exist across the majority of site occurring in nearly every record. The type of made ground varies considerably and includes deposits containing brick, ash, concrete and organic material. A plot of the thickness across site is shown in fig. 4. The thickness generally averages 3-4m occasionally varying between 2m, up to 5.0m. The greatest thicknesses however are concentrated towards the south and east of site reaching depths in excess of 8m and coinciding with the location of low-lying areas in the surface of the gravels such as palaeochannels. The shallowest deposits are those directly above the gravel highs in the central part of the site where the model predicts a depth of less than 1.0m in places.

DISCUSSION

5.1.1 The elevation data from the surface of the gravels has been used to create a map of the site representing the early Holocene topography (fig. 2). A further model proposed by Bates and Whittaker (2004), based on radiocarbon dated age/altitude data for the lower Thames, allows age estimates to be applied to the onset of initial flooding, based on the elevation of the surface of the gravels.

5.1.2 At the lowest elevations within the vicinity of the palaeochannels in the southern sector of the site adjacent to the Thames (-6.5 to -5m OD), major flooding and sedimentation may have been initiated somewhere in the region of 6ka BP. The gravel surface for a large part of the site lies between -4.5 to -3.5 m OD, flooding may have occurred slightly later in these areas between 5800-5300 BP. This suggests for a large part of the site only archaeological remains dating to the Mesolithic and early Neolithic periods may be found directly associated with the surface of the gravels. In the central area of the site however where the surface of the gravels are elevated inundation would have occurred later. As flooding ensued during the Holocene these areas would have been reduced to islands of dry ground within a predominantly wetland environment. As such they may have acted as a focus for human activity exploiting the abundance of resources available on the floodplain, perhaps seasonally. Activity within the surrounding wetland area is likely to have been very low level. These islands would have been the last to be inundated by rising river levels. At the northern extent final burial may have occurred around 3800 BP at -1.2m OD, and to the south a little later. This suggests archaeological remains of any period up until perhaps the middle-late Bronze Age may be located on the surface of the gravels at these locations. It is however more likely these areas acted as a focus during the later part of this phase when the extent of dry ground was much reduced. Previous work elsewhere in the Lower Thames has shown that archaeology is often associated with gravel islands and floodplain margins (section 1.4.2, 1.4.3). Very little however has been identified in the wetter areas, away from such features.

5.1.3 The character of the sediment sequences overlying the basal gravels at Beckton, in terms of lithology and elevation data, are consistent with those previously identified in area (OA 2004). On a superficial level they are comparable to many sequences investigated in the Lower Thames by numerous workers (section 1.3.4). With reference to the recent model proposed by Bates and Whittaker (2004), summarised in Appendix 2, it is likely that Alluvium I relates to stabilisation of channels within the early part of the Holocene (stage 1b). The development of wetland systems between 3-8ka BP (stages 2-3), is represented by Peat I Alluvium II and Peat II. This period saw the development of marshland systems and latterly large expanses of alder carr and reed swamp, dissected by areas occupied by of eroding channels. The height data for Peat II, commonly occurring at elevations between -5m OD -2m OD, is comparable to other radiocarbon dated sequences in the Lower Thames and probably equates with Devoy's Tilbury III peat of Neolithic or Bronze Age date.

5.1.4 Locally however there is much variation in the extent of the major stratigraphic units. Such variations may well be associated with very local factors such as the proximity of the gravel terrace, undulations in the basal topographic template and local drainage patterns (Bates 1998, Bates et al 2000, 2004). Features such as topographic highs in the surface of the gravels and the presence of tributary channels flowing from the edge of the terrace across the floodplain, to a large extent may have dictated the pattern of sediment accumulation in some areas. It is clear that such features are present within the area investigated and account for the range of different lithologies and varying degrees of organic content within lithologies assigned to each main stratigraphic unit. The variations in the range of lithologies suggest a number of different environments of deposition may have been present at any one time. Palaeochannel A runs east-west across the southern edge of site. This may form part of the complex drainage pattern associated with former channels of the River Roding. The earliest deposits associated with channel were localised deposits of Peat I, restricted to the channel margins. Peat I and Peat II were not be traced continuously across the profile of the channel. In places they were replaced by minerogenic deposits of clay-silts. This may represent episodic channel incision and erosion of peat deposits perhaps as the watercourse shifted its position. Palaeochannel B was located in the eastern part of the site (fig. 6) and runs parallel to the modern River Thames. This probably represents the original line of the main river channel, abandoned as it shifted it's course southward. Uniform distributions of Alluvium II, Peat II and Alluvium III were present in this area.

5.1.5 Alluvium III represents the final phase of alluviation as a result of the expansion of brackish water conditions due to rising relative sea-level around 0-3ka BP (stage 4). Traditionally the focus in archaeological and palaeoenvironmental studies has been on the earlier prehistoric deposits of the Thames system. Little attention has been paid to the upper alluvium largely because of the difficulty in dating these deposits. The environment of the floodplain during this later phase probably consisted of saltmarsh and mudflats interspersed with tidal creeks and perhaps freshwater streams issuing from the terrace. Activity may have been low-level, exploiting various seasonal resources. Evidence of such activity however is increasingly been identified in the form of ephemeral structures such fishtraps, wattlework and seasonal activity areas. Evidence of land reclamation dated to the 12th and 13th centuries AD, in the form of drainage ditches and early sea banks, have been identified within the upper alluvium on Rainham and Wennington marshes (OA 2001), and immediately to the south of the river at Woolwich (OA 2002). On Wennington marsh seasonal activity and possible evidence of land reclamation was identified alongside the silted up Wennington Creek, associated with a buried land surface within the upper alluvium. The surface was traced for over a kilometre across the marsh, and in places lay only 0.70m below the modern topsoil.

5.1.6 The thickness of made ground varied across the site. It was generally thickest overlying the palaeochannel areas and towards the modern river. It is much thinner over the topographic gravel highs towards the centre of the site, and towards the margins of the palaeochannels. It is likely that a large part of this material represents deposits dumped in order to raise the general ground surface above the level of the floodplain. The increase in depth over the palaeochannel areas indicates these features may have been extant up until relatively recent times. It is however more likely that decay of organic material and compaction of unconsolidated sediment required these areas to be continually built up with additional material during the site's use in recent times. Similar extensive deposits of made ground have frequently been recorded in areas both to the east and west of the site. To the east, at the Ford Motor Works in Dagenham, archaeological work associated with the construction of the Channel Tunnel Rail Link, recorded material, comprising ash and clinker, that had been dumped to raise the ground level up to 3.5m above the original level of the floodplain. This material was, for the most part, placed directly onto the original ground surface with very little truncation of the underlying alluvium (OA 2003a). Areas of extant, reclaimed marshland, such as Rainham and Wennington marsh further west, give some idea of ground levels within the floodplain during the medieval period subsequent to the building of sea walls. Although there may be some variation upstream, elevations average between 0.0 and +2.0m OD. Similar comparisons can be made to the south of the river at Plumstead and Thamesmead (OA 2003, 2004). The elevations for the base of the made ground at Beckton vary on average between +2.8 and 0.0m OD perhaps suggesting truncation of the top levels of Alluvium III. In the northwestern sector however values reach -0.6m OD to a maximum of -1.60 in the vicinity of borehole TQ48SW949. This suggests, in this area at least, Alluvium III may be substantially truncated as well as perhaps some of the organic deposits below.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1.1 The deposit model has served well to characterise the nature of the sub-surface stratigraphy underlying the present ground surface at Beckton Gasworks. The following conclusions can be made.

- The major stratigraphic sequences conform, on a superficial level, to the regional models that have been outlined by previous workers (section 1.3.4).

- Significant local detail is present within the study area associated with different environments of deposition and local topographic features such as areas of high ground and palaeochannels. The model has confirmed the presence of two palaeochannels, one a north-south tributary, the other probably an abandoned former course of the main Thames channel. An area of high ground in the central part of the site may have existed as an island within a predominately wetland landscape for much of the Neolithic and into the Bronze Age. This situation can be paralleled by other examples in the Thames where archaeological material has been recovered (section 1.4.2). Although the presence of an abandoned channel of the Thames may have resulted in localised erosion of archaeological remains pertaining to the earlier prehistoric period, the location of high ground overlooking the confluence of the Thames and its tributary would have been an ideal location for exploiting the abundance of natural resources available in such an environment, particularly during the Neolithic and Bronze Age. As such this area is considered to have significant archaeological potential.

- The line of the modern Thames and its immediate hinterland, including the abandoned meander in the northeast area of site, should be considered an area of archaeological potential as it may contain evidence of previous waterfronts, revetments or sea banks.

- The waterlogged conditions increase the likelihood of the preservation of organic remains. This includes the remains of wooden structures, as well as palaeoenvironmental material dating from the Mesolithic period onwards. Such material has the potential to contextualize any archaeological remains present, as well and adding to current research data regarding the palaeoenvironmental history and evolution of the Thames floodplain in general. The presence of organic remains could also potentially provide material in which to date the sequences.

- Recent industrial activity at the site resulting in the deposition of extensive deposits of made ground is likely to have left the majority of deposits dated to the prehistoric period unaffected. If truncation has occurred it is more likely to be associated with the upper levels of Alluvium III, the deposition of which is likely to date from the very late prehistoric, Roman and medieval periods.

- The thickness of made-ground across the site offers some protection to the buried alluvial sequences. Key areas of archaeological potential, such as the gravel islands and channel margins however appear to be less protected.

6.1.2 The scale of the study was appropriate to the task of identifying the gross morphology of the sub-surface stratigraphy. The distribution of boreholes however was somewhat uneven, particularly in the area of high ground in the central sector and immediately to the north. The deposit model indicates significant variation exists at a local scale. In addition, the data that was available derived entirely from paper records. Ground-truthing would be required in order to confirm the model and define areas that have been highlighted as archaeologically significant. A possible strategy for further investigation may involve a combination of purposive boreholes, and trial trenching, possibly coupled with preliminary programme of palaeoenvironmental work and radiometric dating. Additional data will allow the model to be refined at a scale appropriate, and perhaps in advance of, purposive archaeological investigation.

7 ACKNOWLEDGEMENTS

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APPENDIX 1: SUMMARY OF BOREHOLE AND TEST-PIT DATA

borehole/testpit	Easting	Northing	Elevation m O.D.	Made ground	Alluvium III	Peat II	Alluvium II	Peat I	Alluvium I	Gravel	Bedrock
BEKBH10	544624	181685	3.63	3	2.7	1.2	0.6	1		3.5	-
BEKBH11	544596	181639	3.44	3.2	4.5	-	-	-	-	3.8	-
BEKBH12	544596	181541	4.64	5.5	1.3	0.7	-	-	-		-
BEKBH13	544782	181635	3.67	3.2	-	-	1.5	3.2	0.6	3.1	-
BEKBH14	544781	181637	3.51	3.2	1.1	0.6	-	-	-		-
BEKBH18	544620	181161	5.7	1.4	5	-	1.1	-	-	2.5	-
BEKBH19	544545	181047	5.4	4.95	5.55	-	-	-	-	2.5	-
BEKBH1A	544693	181379	4.88	2.25	3.75	2.5	0.6	-	-	2.9	-
BEKBH2	544732	181349	5.05	4	4.5	0.5	-	-	-	0.1	-
BEKBH20	544435	180901	5.74	6.6	3.6	-	-	-	-	1.8	-
BEKBH21	544171	181041	5.43	4.6	6.2	-	-	-	-	0.7	-
BEKBH22	544460	181115	6.38	5.3	-	3.1	3.2	-	-	2.9	-
BEKBH3	544770	181402	4.13	3.8	2.1	1.6	2.7	-	-	2.8	-
BEKBH4	544849	181463	4.89	6	0.3	3.2	0.9	-	-	2.8	-
BEKBH5	544919	181474	5.79	3.5	4.4	1.7	0.6	-	-	2.8	-
BEKBH6	544896	181577	3.73	3.8	1.1	4.1	0.1	-	-	3.4	-
BEKBH7	544813	181752	3.94	3.3	2.6	1.3	1.2	-	-	3.6	-
BEKBH8A	544782	181821	3.87	3.2	2.05	3.75	0.2	-	-	2.2	1.1
BEKBH9	544644	181864	3.79	2.7	0.8	-	3.7	-	-	3.3	
BEKTP10	544786	181419	4.06	4	1	-	-	-	-	-	-
BEKTP100	544415	180902	5.17	2.7	0.9	-	-	-	-	-	-
BEKTP108	544196	181058	5.28	4.6	0.6	-	-	-	-	-	-
BEKTP11	544797	181407	4.32	2.5	1.5	-	3	-	-	-	-
BEKTP110	544240	181061	5.12	4	0.3	-	-	-	-	-	-
BEKTP112	544212	181041	4.65	0.4	4.1	-	-	-	-	-	-
BEKTP118	544394	181012	4.86	5.2	1.3	-	-	-	-	-	-
BEKTP121	544354	180941	5.17	5.8	1.2	-	-	-	-	-	-
BEKTP13	544823	181444	3.87	2.1	1.5	-	-	-	-	-	-
BEKTP14	544851	181429	5.3	2.6	2.4	-	-	-	-	-	-
BEKTP15	544884	181472	4.92	3	2	-	-	-	-	-	-
BEKTP17	544939	181506	5.18	2.1	1.6	-	-	-	-	-	-
BEKTP20	544882	181518	4.7	2.2	1.6	-	-	-	-	-	-
BEKTP21	544921	181538	4.33	0.95	4.05	-	-	-	-	-	-
BEKTP23	544861	181563	3.68	1.9	1.4	-	-	-	-	-	-
BEKTP25	544784	181482	3.97	2.1	0.8	-	-	-	-	-	-
BEKTP27	544847	181587	3.44	1.6	1.8	-	-	-	-	-	-
BEKTP29	544840	181607	3.74	2.1	0.5	-	-	-	-	-	-
BEKTP3	544796	181697	3.49	1.3	0.8	0.9	-	-	-	-	-
BEKTP31	544854	181583	3.53	1.9	1.5	-	-	-	-	-	-
BEKTP33	544639	181503	3.72	2	0.5	-	-	-	-	-	-
BEKTP34	544877	181616	2.92	2.4	1.2	-	-	-	-	-	-
BEKTP43	544774	181645	3.04	1.3	0.7	-	-	-	-	-	-
BEKTP47	544742	181664	3.39	1.9	0.8	-	-	-	-	-	-

borehole/testpit	Easting	Northing	Elevation m O.D.	Made ground	Alluvium III	Peat II	Alluvium II	Peat I	Alluvium I	Gravel	Bedrock
BEKTP5	544724	181358	4.78	3	1.1	-	-	-	-	-	-
BEKTP53	544671	181608	3.11	1	1.5	-	-	-	-	-	-
BEKTP6	544715	181367	4.72	2.3	0.5	-	-	-	-	-	-
BEKTP60	544639	181648	3.24	1.4	1	-	-	-	-	-	-
BEKTP64	544703	181633	2.75	1.5	3	-	-	-	-	-	-
BEKTP66	544709	181791	3.5	2.6	0.5	-	-	-	-	-	-
BEKTP72	544748	181694	3.81	2.2	-	1.9	-	-	-	-	-
BEKTP75	544763	181747	4.18	2.4	0.8	0.1	-	-	-	-	-
BEKTP79	544588	181569	3.66	3.2	1.8	-	-	-	-	-	-
BEKTP81	544589	181595	3.73	2.8	0.7	-	-	-	-	-	-
BEKTP84	544681	181521	3.04	2	3	0.1	-	-	-	-	-
BEKTP87	544704	181501	3.6	3.8	1.3	-	-	-	-	-	-
BEKTP89	544507	181179	5.94	2.8	3.2	-	-	-	-	-	-
BEKTP9	544733	181424	4.24	1.6	1.8	-	-	-	-	-	-
BEKTP92	544594	181137	5.82	3	0.6	-	-	-	-	-	-
BEKTP96	544469	181007	5.12	3	1.2	-	-	-	-	-	-
BELTP123	544430	180916	5.21	4.5	0.3	-	-	-	-	-	-
TQ486SW984	544292	180934	5.218	4.6	0.4	-	-	-	-	-	-
TQ48SE407	545210	181050	-8.4	-	-	-	-	-	-	4.2	20.8
TQ48SE934	544039	181106	5.16	3.8	2.5	1	0.7	-	-	8.95	-
TQ48SE965	543972	181703	3.86	3.3	1.5	3.2	-	-	-	2.5	7.5
TQ48SE966	544061	181693	3.55	3.4	3	-	-	-	-	4	7.6
TQ48SE967	543932	181436	4.59	4.2	2.3	1.6	1.2	-	-	3.1	12.6
TQ48SW1000	544391	180892	5	3.25	6	0.25		-	-	5.5	3
TQ48SW1001	544034	181062	5.2	4.4	2.25	1.75	1.3	0.7	1.3	4	9.3
TQ48SW1002	544597	180809	-8.4	-	0.7	-	-	-	-	2.15	27.15
TQ48SW108	544420	182142	1.52	-	2.29	0.71	1.3	-	-	1.8	-
TQ48SW116	543820	182050	1.84	-	4.9	-	-	-	-	1.2	-
TQ48SW117	543910	182030	2	-	4.9	-	-	-	-	1.2	-
TQ48SW118	543990	182010	1.4	-	4.72	-	-	-	-	1.22	-
TQ48SW119	544090	182000	2.31	-	5.2	1.2	-	-	-	-	-
TQ48SW120	544138	181999	2	-	4.9	1.2	-	-	-	-	-
TQ48SW121	544255	181970	1.35	-	1.5	3.4	-	-	-	1.2	-
TQ48SW122	544335	181958	1.6	-	1.8	3.4	-	-	-	1.2	-
TQ48SW1227	543760	181390	5.79	5.5	2.25	-	-	-	-	2.75	1.5
TQ48SW123	544373	181948	1.83	-	3.4	1.5	-	-	-	1.2	-
TQ48SW124	544490	181932	6.87	-	3.51	0.91	-	-	-	4.57	-
TQ48SW125	544560	181920	1.85	-	4.04	1.83	-	-	-	1.22	-
TQ48SW168	544830	181244	1.6	10.83	3.7	-	-	-	-	4.11	3.23
TQ48SW169	544539	181048	0.51	4.27	6.1	-	-	-	-	5.19	14.95
TQ48SW170	544499	180983	5.49	4.27	5.19	-	-	-	-	5.8	5.8
TQ48SW171	544478	181045	5.49	3.97	8.24	-	-	-	-	3.05	3.64
TQ48SW172	544419	181040	5.49	4.58	2.6	3.81	0.92			5.8	1.22
TQ48SW331	544440	182330	3.68	1.7	2.1	-	-	-	-	7.4	9.9
TQ48SW349A	544500	182000	4.41	-	8	-	-	-	-	3.7	10.5

borehole/testpit	Easting	Northing	Elevation m O.D.	Made ground	Alluvium III	Peat II	Alluvium II	Peat I	Alluvium I	Gravel	Bedrock
TQ48SW365	543800	182400	1.58	-	1.98	1.98	-	-	-	4.57	-
TQ48SW366	543850	182260	1.52	-	1.22	2.73	-	-	-	4.58	-
TQ48SW367	543870	182170	1.49	-	1.52	2.75	-	-	-	4.57	-
TQ48SW368	543880	182070	1.55	-	2.44	2.13	-	-	-	4.57	-
TQ48SW39	544410	181940	1.68	-	2.1	2.5	0.3	-	-	1.2	-
TQ48SW394	544730	181550	3.79	2.9	-	5.49	-	-	-	10.52	19.83
TQ48SW395	544440	181320	4.27	2.44	6.41	-	-	-	-	1.67	-
TQ48SW396	544520	181320	4.17	1.37	-	-	-	-	-	-	-
TQ48SW397	544530	181380	3.56	0.76	4.73	1.37	1.07	0.31	0.91	7.32	1.68
TQ48SW398	544480	181390	4.3	0.76	2.9	3.81	-	-	-	0.46	13.12
TQ48SW399	544460	181350	4.3	1.37	8.54		-	-	-	7.48	1.9
TQ48SW40	544650	181890	1.65	-	1.91	2.74	-	-	-	1.52	
TQ48SW400	544180	181460	3.97	3.66	-	-	-	-	-	12.2	5.49
TQ48SW401	544150	181400	3.81	3.97	1.23	-	-	-	-	11.29	7.32
TQ48SW402	544100	181380	3.86	1.52	3.36	-	-	-	-	8.54	8.08
TQ48SW403	544060	181430	3.46	3.36	-	-	-	1.52	-	7.02	8.99
TQ48SW404	544110	181490	3.18	3.05	0.61	4.27	0.61	-	-	2.75	9.15
TQ48SW405	544220	181570	4.37	3.36	-	-	2.44	3.2	-	6.25	6.71
TQ48SW406	544160	181470	4.27	0.31	1.52	-	-	0.15	-	3.97	5.64
TQ48SW42	544443	181620	3.81	-	0.61	-	-	-	-	13.72	7.62
TQ48SW428	544470	180890	6	-	2.82	-	-	-	-	5.64	3.51
TQ48SW429	544610	181060	12.02	-	5.34	-	-	-	-	2.82	6.48
TQ48SW43	544605	181552	4	-	1.8	3.9	-	-	-	15.6	39.6
TQ48SW430	544710	181220	5.21	7.63	-	-	-	-	-	6.55	3.21
TQ48SW431	544860	181340	5.21	-	1.68	-	-	-	-	8.77	10.9
TQ48SW683	544099	181062	5.4	5.8	1.5	0.65	3.4	0.45	0.7	2.9	3.6
TQ48SW684	543945	180944	5.5	6.4	-	-	0.8	1.5	1.3	-	-
TQ48SW685	543940	181064	5.61	4.8	1.4	-	0.9	-	-	11.1	3.7
TQ48SW686	543775	181037	5.44	4.8	-	-	1.1	1.7	0.3	12.1	
TQ48SW687	543826	181179	4.22	3.7	4.05	-	-	-	-	8.65	3.2
TQ48SW688	543800	181369	4.46	3.7	1.6	-	2.4	-	-	8.1	3.7
TQ48SW690	544426	180901	5.12	5.1	4.5	-	-	-	-	8.3	3.6
TQ48SW691	544388	180917	5.18	2.8	6.8	-	-	-	-	5.8	3.1
TQ48SW692	544355	180935	5.21	5.1	5.6	-	-	-	-	4	2.8
TQ48SW693	544296	180996	5.24	2.9	3.1	2	3.1	-	-	3.2	10.7
TQ48SW694	544250	181005	5.07	4.9	1.6		3.3	-	-	5	2.8
TQ48SW695	544203	181022	5.23	4.7	2.5	-	-	-	-	8.1	3.8
TQ48SW696	544155	181045	5.41	4.8	5.9	-	-	-	-	5.4	3.9
TQ48SW697	543992	180929	4.95	4.95	2.35	1.3	0.8	-	-	6.8	2.8
TQ48SW698	544031	180880	5.48	4.4	1.1	1.3		-	-	8	4.2
TQ48SW699	543971	180990	5.07	5.8	-	-	1	2.4	2.4	4.1	3.3
TQ48SW700	543997	181068	5.36	4.8	1.4	1.2	-	-	-	8	3.6
TQ48SW701	543896	180966	4.29	5.1	1.55	2.8	1.95	-	-	4.9	2.7
TQ48SW702	543923	181012	5.56	5.3	3	0.6	1.6	-	-	7.6	2.9
TQ48SW703	543958	181095	5.44	4.3	-	1.5	2.6	0.9	-	7.8	3.4

borehole/testpit	Easting	Northing	Elevation m O.D.	Made ground	Alluvium III	Peat II	Alluvium II	Peat I	Alluvium I	Gravel	Bedrock
TQ48SW704	543840	180994	5.87	5.45	1.65	1.5	-	-	-	10.8	2.6
TQ48SW705	543879	181027	5.88	6.1	1	1.1	0.7	-	-	10.8	2.8
TQ48SW706	543895	181060	5.81	5.9	1.4	1	0.4	-	-	11.5	2.8
TQ48SW707	543900	181130	5.01	4.5	1.4	1.2	1.2	-	-	8.9	2.8
TQ48SW708	543814	181006	5.76	6.3	1.2	1.3	1	-	-	9	3.2
TQ48SW709	543838	181047	5.76		1.2	1.3	0.6	-	-	16.5	2.4
TQ48SW710	543858	181083	5.65	5.5	1.3	1.3	-	-	-	9.6	2.8
TQ48SW711	543853	181156	4.89	4.2	4.2	-	-	-	-	9.5	7.1
TQ48SW712	543867	181189	4.91	3.8	-	-	2.4	0.5	-	9.2	3.1
TQ48SW713	543894	181238	5.48	4.6	1.1	1.2	-	-	-	8.9	3.2
TQ48SW714	543797	181063	5.7	5.3	1.2	1.4	1	-	-	11.5	3
TQ48SW715	543816	181106	5.06	4.4	-	-	1.7	0.7	-	12	3.2
TQ48SW716	543837	181214	4.99	4.2	1.8	0.6	0.5	-	-	9.8	8.1
TQ48SW717	543814	181247	4.75	3.75	2.95	-	-	-	-	8.2	3.1
TQ48SW718	543789	181273	4.42	3.8	1.1	1.6	-	-	-	8.3	3.2
TQ48SW719	543841	181302	4.84	3.8	4.6	0.5	0.65	-	-	5.25	3.2
TQ48SW720	543840	181370	4.57	3.9	3.7	-	-	-	-	7.3	4.1
TQ48SW721	543880	181459	3.55	2.7	4.4	-	-	-	-	4.3	3.6
TQ48SW722	543841	181508	2.4	1.6	1.2	1.9	-	-	-	5.8	4.5
TQ48SW723	543776	181508	2.38	2.6	0.25	1.55	0.2	0.5	-	5.5	4.4
TQ48SW724	543736	181256	4.49	3.4	3	-	-	-	-	9.2	4.1
TQ48SW725	543728	181315	4.69	3.8	3.55	-	-	-	-	7.25	3.4
TQ48SW726	543738	181365	5.16	4.2	3.3	-	-	-	-	7.1	3.4
TQ48SW727	543739	181414	4.19	3.5	1.6	2.85	0.2	-	-	4.55	5.4
TQ48SW728	543743	181460	2.54	2.4	0.75	2.85	0.5	-	-	3.9	4.6
TQ48SW729	543745	181510	2.24	1.8	1.1	2.05	0.45	-	-	5	4.6
TQ48SW733	543702	181465	3.42	1.7	3.1	1.3	-	-	-	5.5	3.4
TQ48SW734	543703	181505	2.14	1.45	1.85	2	0.45	-	-	5.35	3.9
TQ48SW742	543890	181260	5.17	1.1	5.1	-	-	-	-	9.2	3.6
TQ48SW80	544220	181950	3.81	-	6.1	-	-	-	-	6.4	109.9
TQ48SW855	543880	182110	1.64	-	4	-	-	-	-	0.15	-
TQ48SW856	543840	182170	1.7	-	4.7	-	-	-	-	0.1	-
TQ48SW857	543780	182180	1.29	-	3.5	-	-	-	-	0.3	-
TQ48SW858	543740	182100	1.51	-	3.8	-	-	-	-	0.4	-
TQ48SW859	543740	182160	1.29	-	2.9	-	-	-	-	0.6	-
TQ48SW860	543750	182300	1.21	-	2.9	0.3	0.7		-	0.3	-
TQ48SW861	543730	182240	1.52	1.6	2.4	-	-	-	-	0.3	-
TQ48SW863	543790	182240	2.04	0.76	1.64	0.6	1.5	-	-	0.2	-
TQ48SW864	543830	182340	1.53	1.2	1.4	1.9	0.2	-	-	0.05	-
TQ48SW865	543840	182270	1.27	-	3.3	-	-	-	-	0.4	-
TQ48SW866	543890	182310	1.23	-	0.8	0.9	1.2	-	-	1.1	-
TQ48SW867	543840	182220	1.65	-	1.7	0.8	0.8	-	-	-	-
TQ48SW868	543800	182160	1.5	-	1.75	0.35	0.9	-	-	-	-
TQ48SW869	543880	182210	1.33	-	2.2	0.4	-	-	-	-	-
TQ48SW870	543870	182250	1.23	-	1.7	1	-	-	-	-	-

borehole/testpit	Easting	Northing	Elevation m O.D.	Made ground	Alluvium III	Peat II	Alluvium II	Peat I	Alluvium I	Gravel	Bedrock
TQ48SW871	543900	182200	2.55	1.55	0.05	-	-	-	-	-	-
TQ48SW872	543820	182260	2.6	1.6	1.4	-	-	-	-	-	-
TQ48SW873	543820	182240	1.88	0.75	0.65	-	-	-	-	-	-
TQ48SW874	543830	182250	1.9	0.4	1.9	-	-	-	-	-	-
TQ48SW875	543830	182260	1.87	0.45	1.85	-	-	-	-	-	-
TQ48SW876	543820	182290	1.9	0.4	1.8	-	-	-	-	-	-
TQ48SW877	543810	182280	1.94	0.7	1.6	-	-	-	-	-	-
TQ48SW879	543780	182250	2	0.85	0.25	-	-	-	-	-	-
TQ48SW880	543780	182240	2	0.2	1.25	-	-	-	-	-	-
TQ48SW881	543820	182300	1.5	1.2	1.6	-	-	-	-	-	-
TQ48SW882	543830	182280	1.6	1.5	2.6	-	-	-	-	0.4	-
TQ48SW883	543780	182280	1.8	1	0.6	-	-	-	-	-	-
TQ48SW885	543760	182190	1.1	-	3.5	-	-	-	-	6.1	5.4
TQ48SW886	543750	182110	1.31	-	4.3	-	-	-	-	4.5	6.2
TQ48SW887	543830	182150	1.54	-	3.9	-	-	-	-	5.2	5.9
TQ48SW904	544521	180812	-3.15	-	6.75	-	-	-	-	0.85	17.4
TQ48SW905	544563	180831	-6.7	-	0.55	-	-	-	-	3.7	20.75
TQ48SW906	544538	180843	-2.93	-	7.45	-	-	-	-	4.5	17.55
TQ48SW908	544552	180875	-2.65	-	5.35	-	-	-	-	2.35	17.3
TQ48SW909	544622	180936	-5.25	-	2.8	-	-	-	-	2.85	19.35
TQ48SW911	544570	180846	-6.4	-	2.4	-	-	-	-	1.8	20.8
TQ48SW915	544553	180815	-7	-	3.6	-	-	-	-	0.9	20.5
TQ48SW917	544433	180913	5.15	5.3	4.3	-	-	-	-	4	11.4
TQ48SW918	544429	180908	5.28	5	4.7	0.8	-	-	-	0.4	-
TQ48SW919	544419	180888	5.03	4.9	5.1	-	-	-	-	3.4	14.6
TQ48SW920	544377	180945	5.24	1.3	10	-	-	-	-	3.4	9.85
TQ48SW922	544336	180925	5.23	4.6	-	0.2	6.6	-	-	-	10.2
TQ48SW923	544311	180982	5.25	4.8	5.6	0.4	-	-	-	5.3	0.9
TQ48SW924	544273	180957	5.18	5	5.4	-	-	-	-	4.4	10.2
TQ48SW925	544261	181084	5.42	5.8	5	-	-	-	-	4.9	9.3
TQ48SW926	544246	181013	5.03	5.1	1.4	5	-	-	-	3.4	10.1
TQ48SW927	544208	180989	5	4.6	6.4	-	-	-	-	3.8	10.15
TQ48SW928	544184	180917	5.04	4.2	4.4	-	-	-	-	1.6	5.5
TQ48SW930	544142	181027	5.38	4	6.5	-	-	-	-	4.9	9.6
TQ48SW931	544131	181083	5.28	5.3	2.6	0.9	1.4	-	-	2.2	12.6
TQ48SW932	544077	181083	5.2	4.4	3	2.7	1.9	-	-	5.8	7.15
TQ48SW933	544058	181030	5.28	3.3	0.4	-	2.3	3.1		6.2	9.7
TQ48SW935	544023	181186	5.26	3.7	2.2	0.3	-	-	-	6.1	9.9
TQ48SW936	543976	181194	5.25	4.1	2.4	0.5	2.8	-	-	6.9	9.25
TQ48SW937	543990	181250	7.76	6.7	1.9	1.2	1.8	-	-	6.6	8
TQ48SW938	543947	181253	7.72	7.2	-	-	0.6	0.6	0.5	6.9	0
TQ48SW939	543970	181290	6.09	5.5	-	-	1.5	-	-	7.8	7
TQ48SW940	543930	181308	5.2	4.2	-	-	4.7	-	-	0.95	7.05
TQ48SW941	544296	181326	5.23	4	3.8	-	4.3	-	-	3.5	4.4
TQ48SW942	543977	181346	3.83	2.8	5.1	-	-	-	-	0.7	6.4

borehole/testpit	Easting	Northing	Elevation m O.D.	Made ground	Alluvium III	Peat II	Alluvium II	Peat I	Alluvium I	Gravel	Bedrock
TQ48SW943	544407	180912	5.12	3.1	6.7	-	-	-	-	5.7	4
TQ48SW945	543914	181991	2.09	1.1	2.1	3	0.4	-	-	4	14.4
TQ48SW946	543948	181624	3.25	2.2	-	-	4.1	1	-	4.3	-
TQ48SW947	543919	181626	2.65	2.2	4.2	-	-	-	-	5.6	6
TQ48SW948	543984	181795	3.79	4.1	0.8	-	-	-	-	7.1	6.3
TQ48SW949	543917	181901	3.94	6	-	1.6	0.6	-	-	4.2	7.1
TQ48SW950	543986	181983	3.77	2.1	3.6	-	-	-	-	6.3	13
TQ48SW951	543944	181990	3.62	2.9	3.85	-	-	-	-	4.05	8.7
TQ48SW952	543983	182036	3.1	2.2	5.4	-	-	-	-	4.2	7.2
TQ48SW953	543949	182054	3.01	1.9	2.6	1.3	-	-	-	6.65	12.55
TQ48SW954	544070	182277	1.31	-	1.9	1.25	-	-	-	7.15	8.2
TQ48SW955	543968	182379	1.4	-	1	2.5	-	-	-	7.1	7.9
TQ48SW977	544524	180873	-0.7	-	7.5	-	-	-	-	2	15.5
TQ48SW978	544486	180846	-0.7	8.1	-	-	-	-	-	1.7	3
TQ48SW981	544448	180936	5.18	5.4	0.1	-	-	-	-	-	-
TQ48SW982	544343	180905	5.02	5.1	0.4	-	-	-	-	-	-
TQ48SW983	544381	180964	4.94	3.6	1.2	-	-	-	-	-	-
TQ48SW985	544322	180986	5.19	5.7	0.1	-	-	-	-	-	-
TQ48SW986	544234	180964	5.05	4.2	0.6	-	-	-	-	-	-
TQ48SW987	544266	181006	5.01	4.4	0.1	-	-	-	-	-	-
TQ48SW988	544187	180985	5.14	4.5	0.25	-	-	-	-	-	-
TQ48SW989	544210	181032	4.8	4.2	0.8	-	-	-	-	-	-
TQ48SW990	544132	181014	5.3	2.6	0.9	-	-	-	-	-	-
TQ48SW991	544162	181062	5.27	5	0.2	-	-	-	-	-	-
TQ48SW992	544086	181041	5.11	2.8	0.5	-	-	-	-	-	-
TQ48SW993	544114	181101	5.23	3.1	0.3	-	-	-	-	-	-
TQ48SW994	544060	181102	5.15	4.3	0.4	-	-	-	-	-	-
TQ48SW995	543935	181333	5.09	4.3	0.4	-	-	-	-	-	-
TQ48SW996	544398	180886	4.82	3	0.6	-	-	-	-	-	-
TQ48SW997	543870	181623	2.66	2.2	0.8	-	-	-	-	-	-
TQ48SW998	543947	181875	3.46	2.6	0.2	-	-	-	-	-	-
TQ48SW999	543983	181976	3.64	2.8	0.6	-	-	-	-	-	-

APPENDIX 2: SUMMARY OF DEPOSIT MODEL

Beckton Gasworks	Lower Thames Deposit Model *(after Bates and Whittaker 2004)*					
Unit	Model Stage	Time frame	Geological events	Dominant sediment type	Inferred environments	Associated archaeology
	1a	15-30ka B.P.	Reworking of the East Tilbury Marshes Gravel	Sands and gravels	Cold climate periglacial slopes with active solifluction and possible loess blow	
			downcutting		*active erosional*	
Gravel	*1a*	10-15ka B.P.	Deposition of the Shepperton Gravel	Sands and gravels	Braided channel	Occasional activity associated with channel margins and sporadic finds across floodplain surface. Most finds reworked
?Alluvium I	*1b*	8-10ka B.P.	Landscape stability	Some sand deposition in meandering channels, elsewhere weathering of late Devensian sediments to form soils	Development of woodlands and meandering channels on floodplain	Occasional activity associated with channel margins and sporadic finds across floodplain surface. Some reworked finds
?Alluvium I Peat I Alluvium II	*2*	5-8ka B.P.	Sea-level rise resulting in transgression of marine/estuarine conditions from outer estuary into inner estuary and progressive backing-up of lower reaches of freshwater channels	Fine grained silts, clays and sands	Expanded freshwater marshland systems resulting from back-up of lower reaches of river channels giving way to estuarine channels and saltmarsh systems	Occasional activity associated with channel margins and sporadic finds across floodplain surface. Occupation becoming focused on drier ground at margins of floodplain. Mixed *in situ* and reworked finds
Peat II	*3*	3-5ka B.P.	Expansion of semi-terrestrial wetlands and marshes giving way to coastal marshlands during phase of apparent relative sea-level fall	Peats and organic silts with minerogenic sedimentation in channels	Alder carr wetlands with replacement brackish marshland towards end of phase	Extensive occupation of the dry ground at the margins of the floodplain as well as activity on remnant 'islands' of sand and gravel within the floodplain. Construction of wooden trackways at the edges of the marsh in places. *In situ* material probably common
Alluvium III	*4*	0-3ka B.P.	Expansion of brackish water conditions due to rising relative sea-level.	Fine grained silts, clays and sands	Estuarine channels and saltmarsh systems	Activity sporadically throughout the floodplain with evidence for resource gathering/hunting and water craft and infrastructure. Eventual colonisation of floodplain with land reclamation.

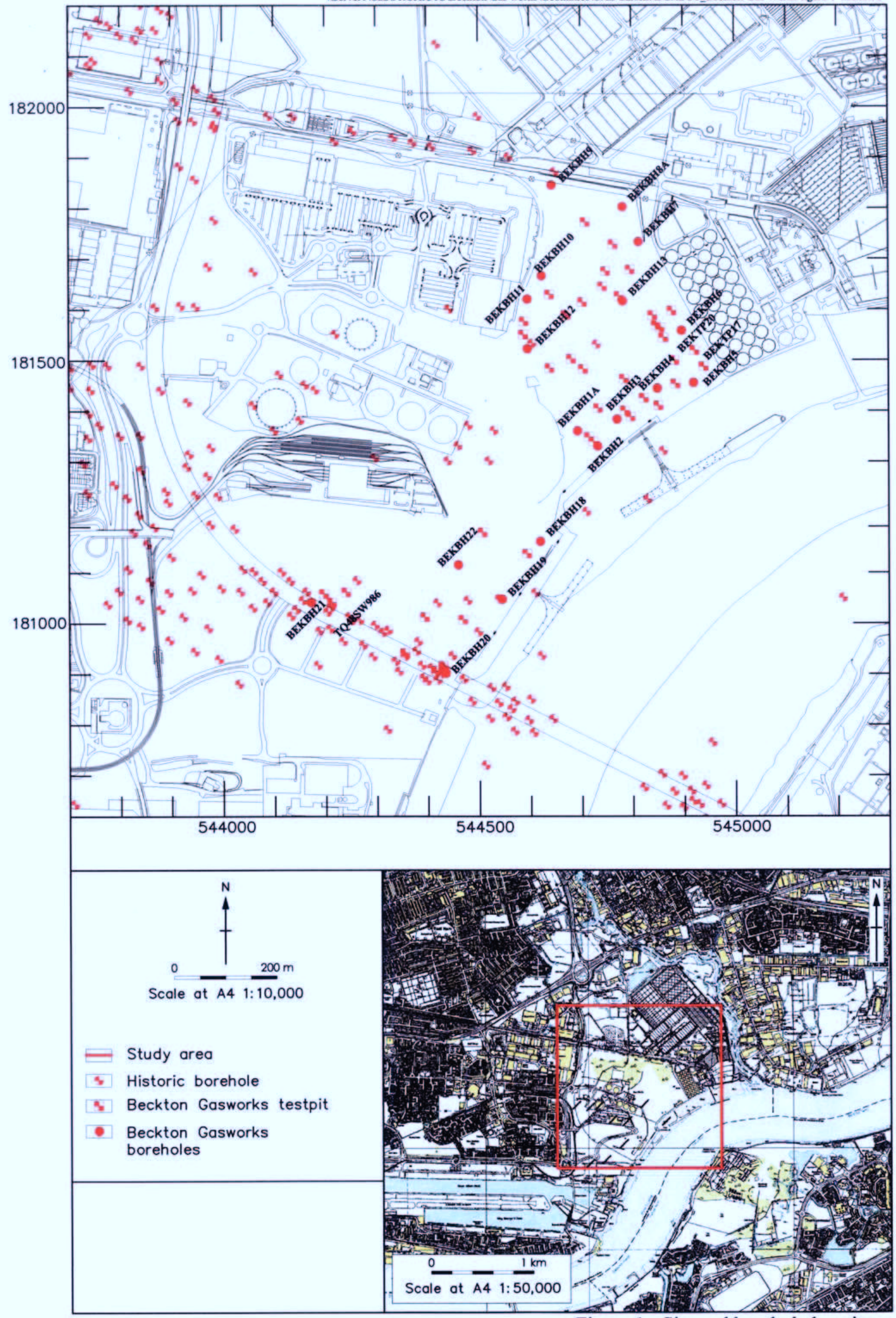
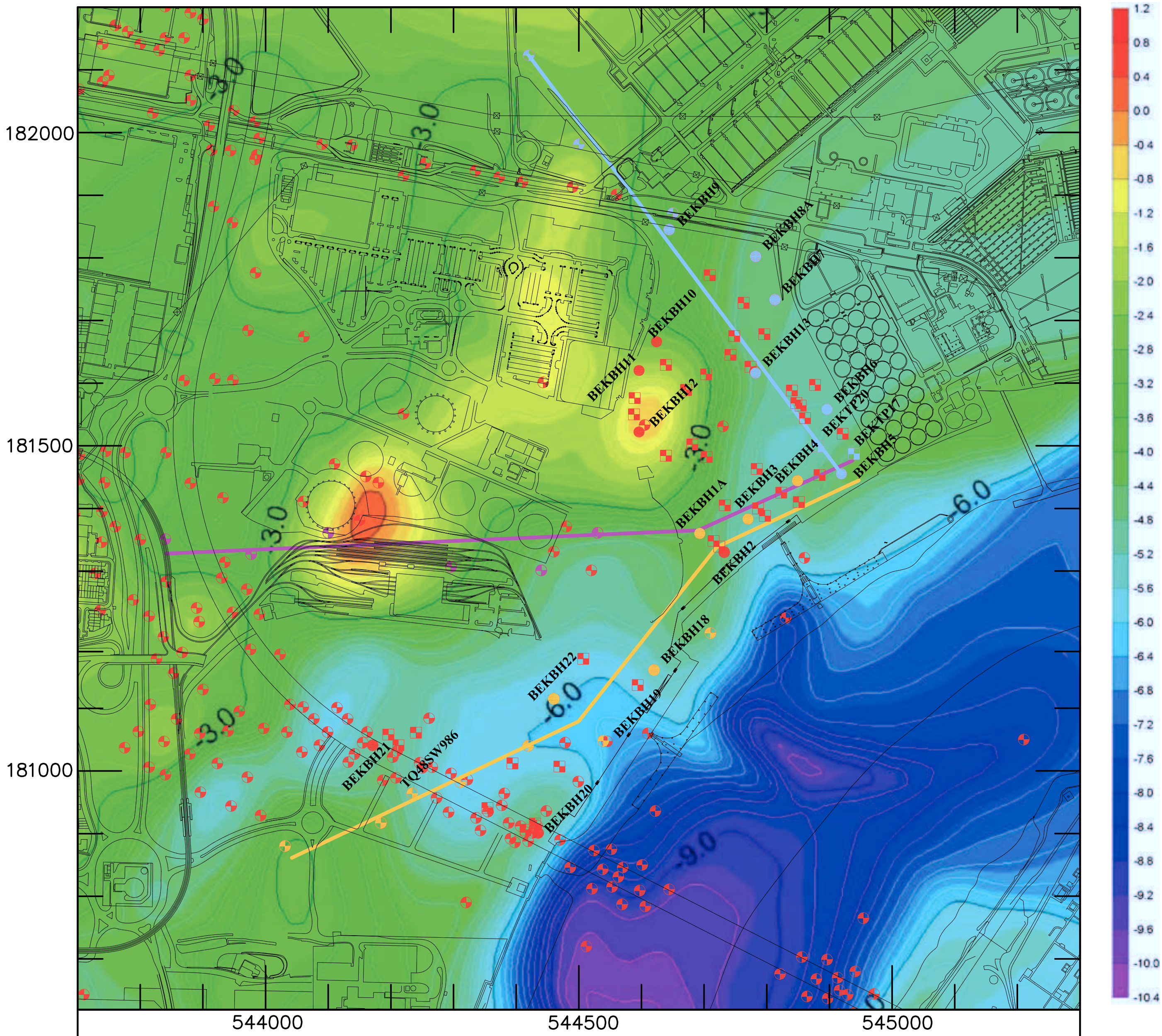


Figure 1 - Site and borehole locations



Section 1

Beckton testpit/Borehole section 1

Section 2

Beckton testpit/Borehole section 2

Section 3

Beckton testpit/Borehole section 3

N

0 200 m

Scale at A4 1:10,000

Figure 2 - Location of sections 1, 2 and 3, with underlying gravel topography

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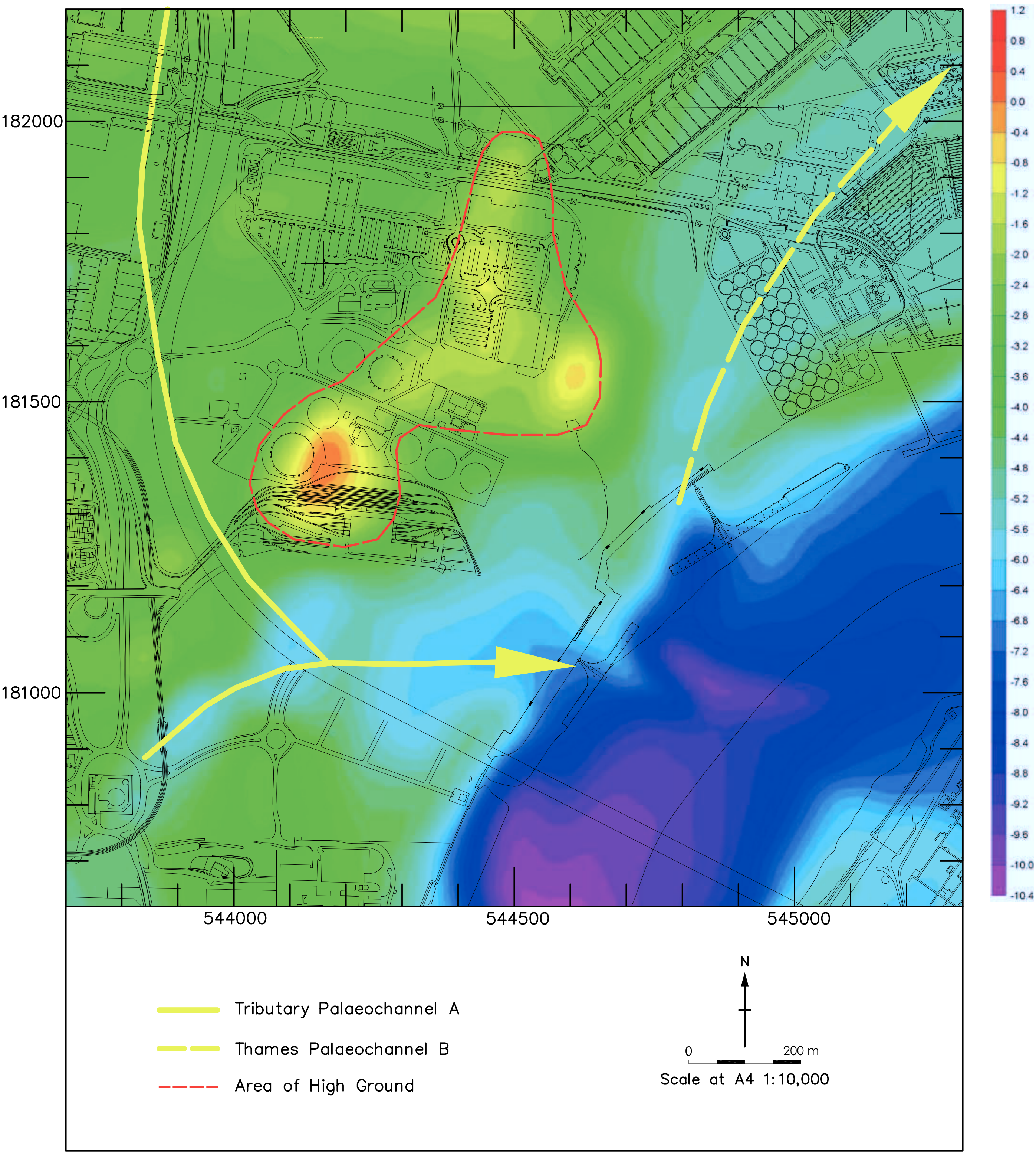


Figure 3 - Gravel surface topography in metres OD showing location of palaeochannels

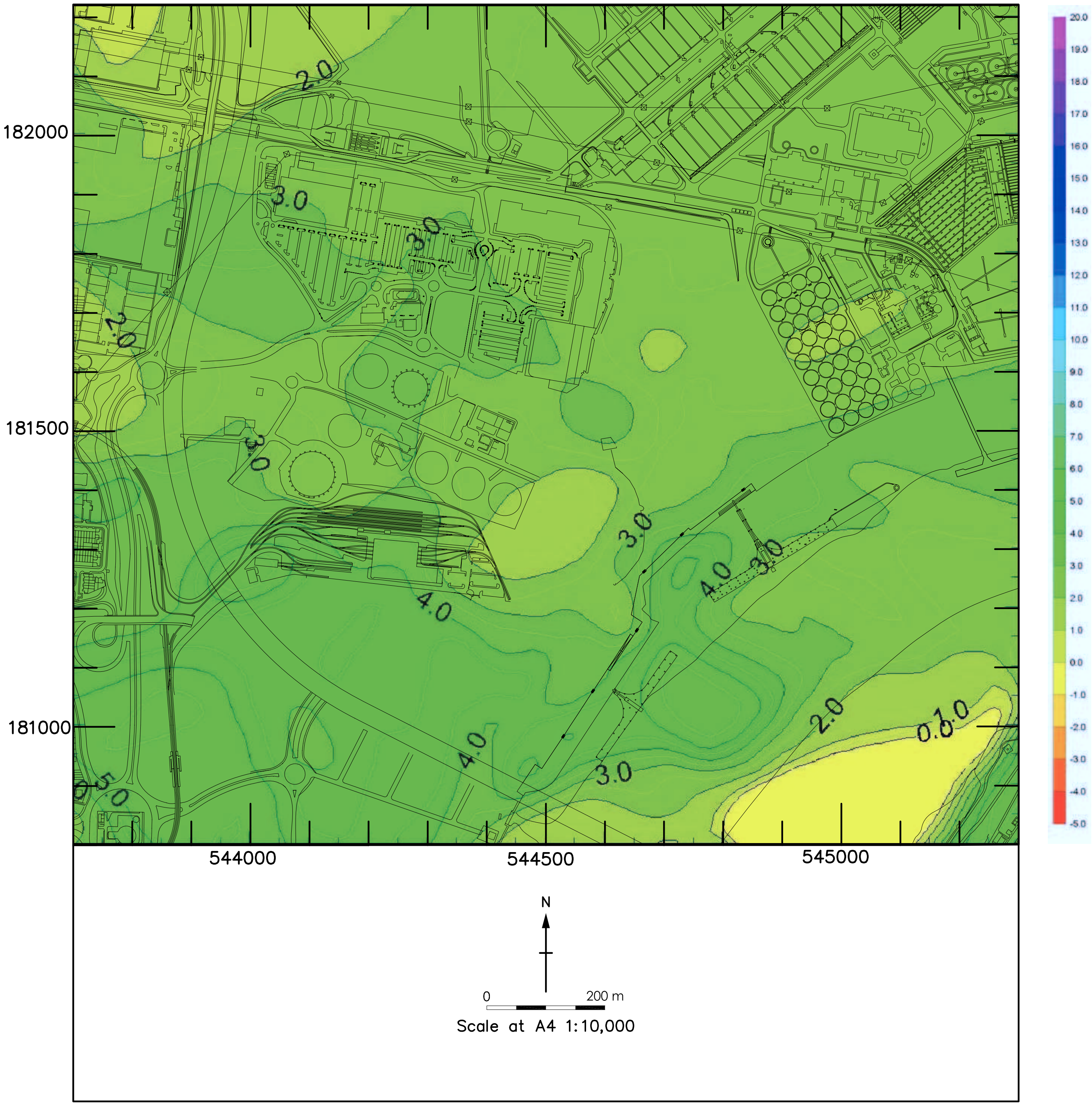


Figure 4 - Extent and thickness of made ground (m)

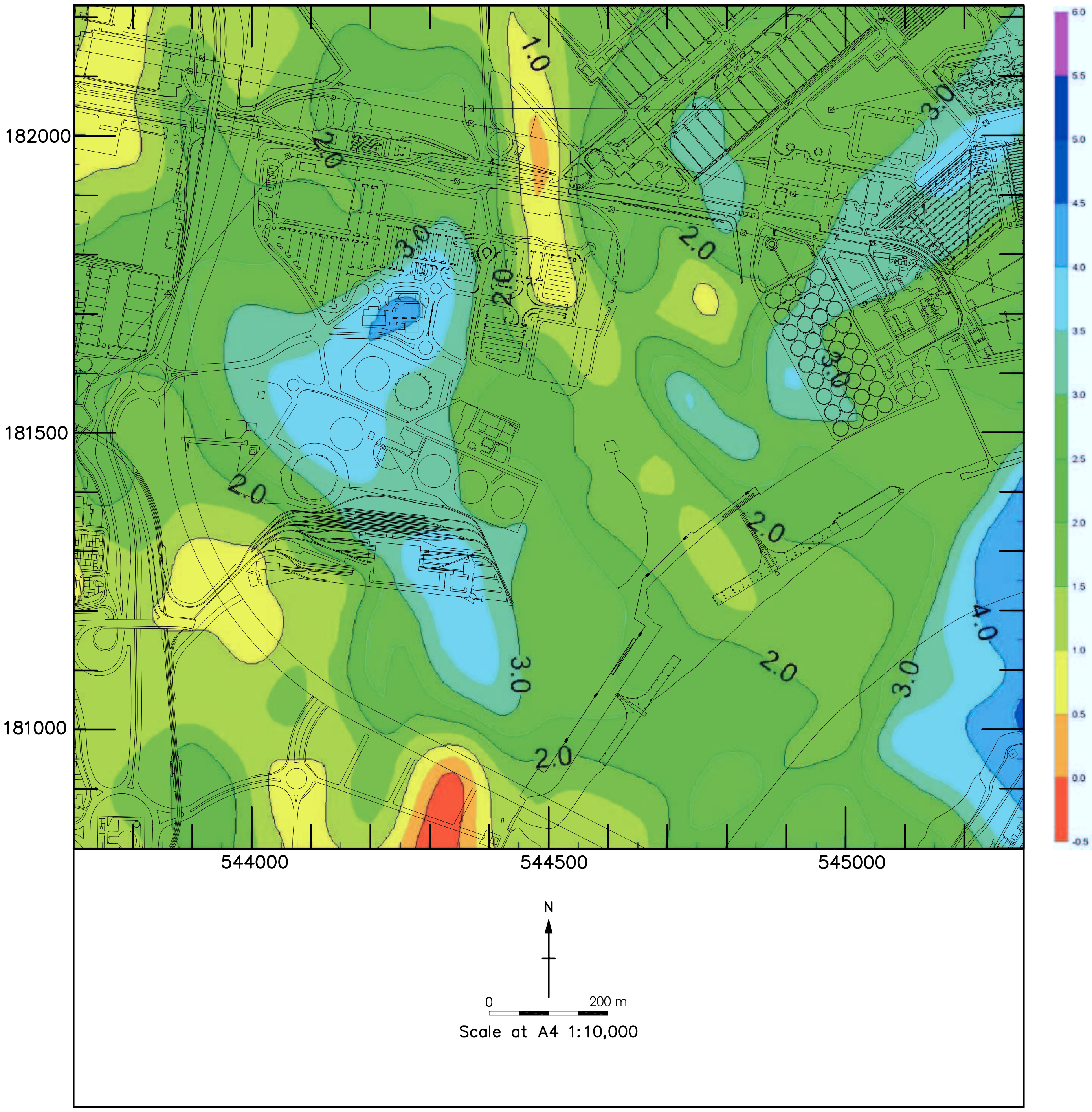
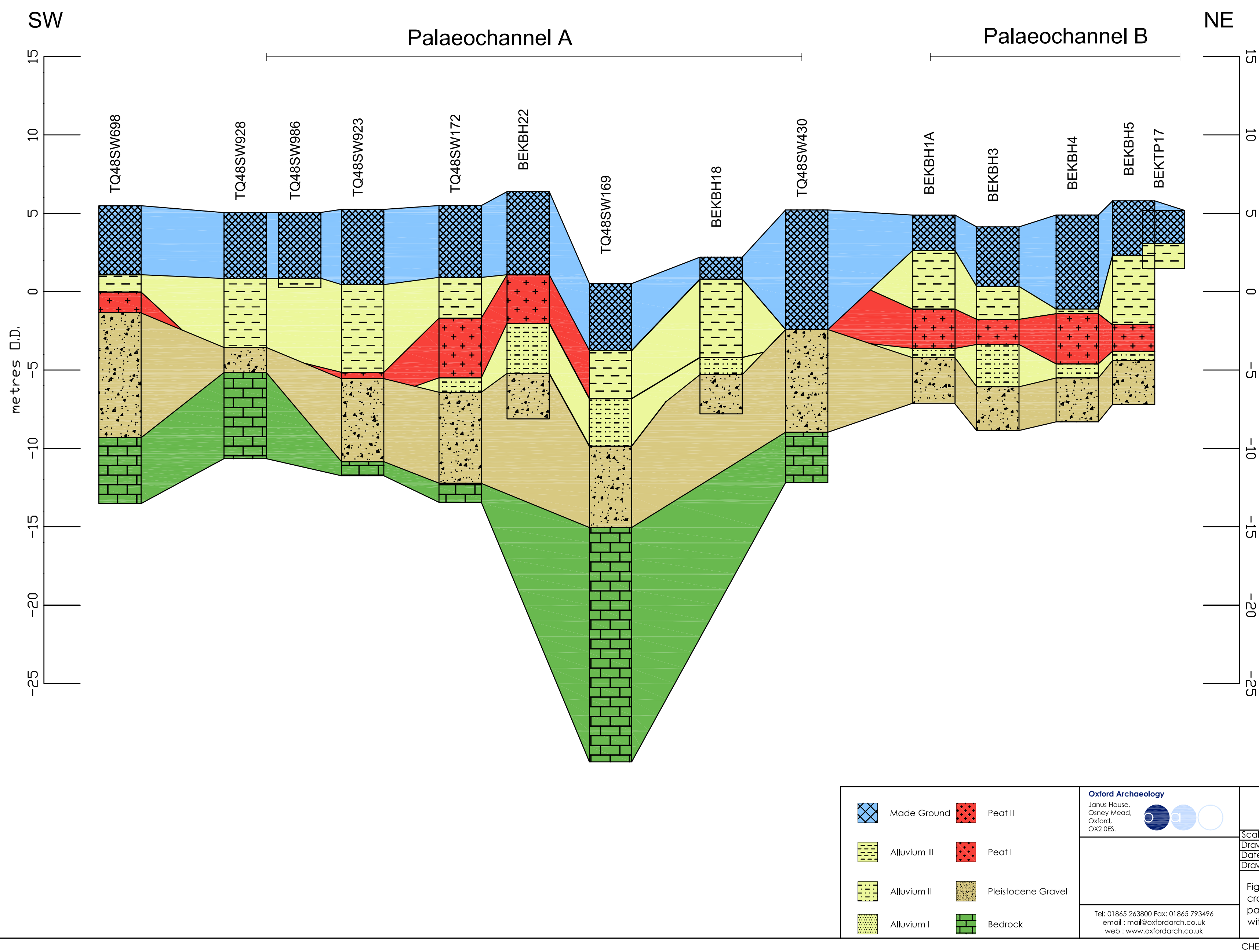


Figure 5 - Extent and thickness of peat II (m)



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Beckton Gas Works

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Drawing Title	

Figure 6 - Section 1: NE - SW cross section through two paleochannels located within Beckton Gas Works

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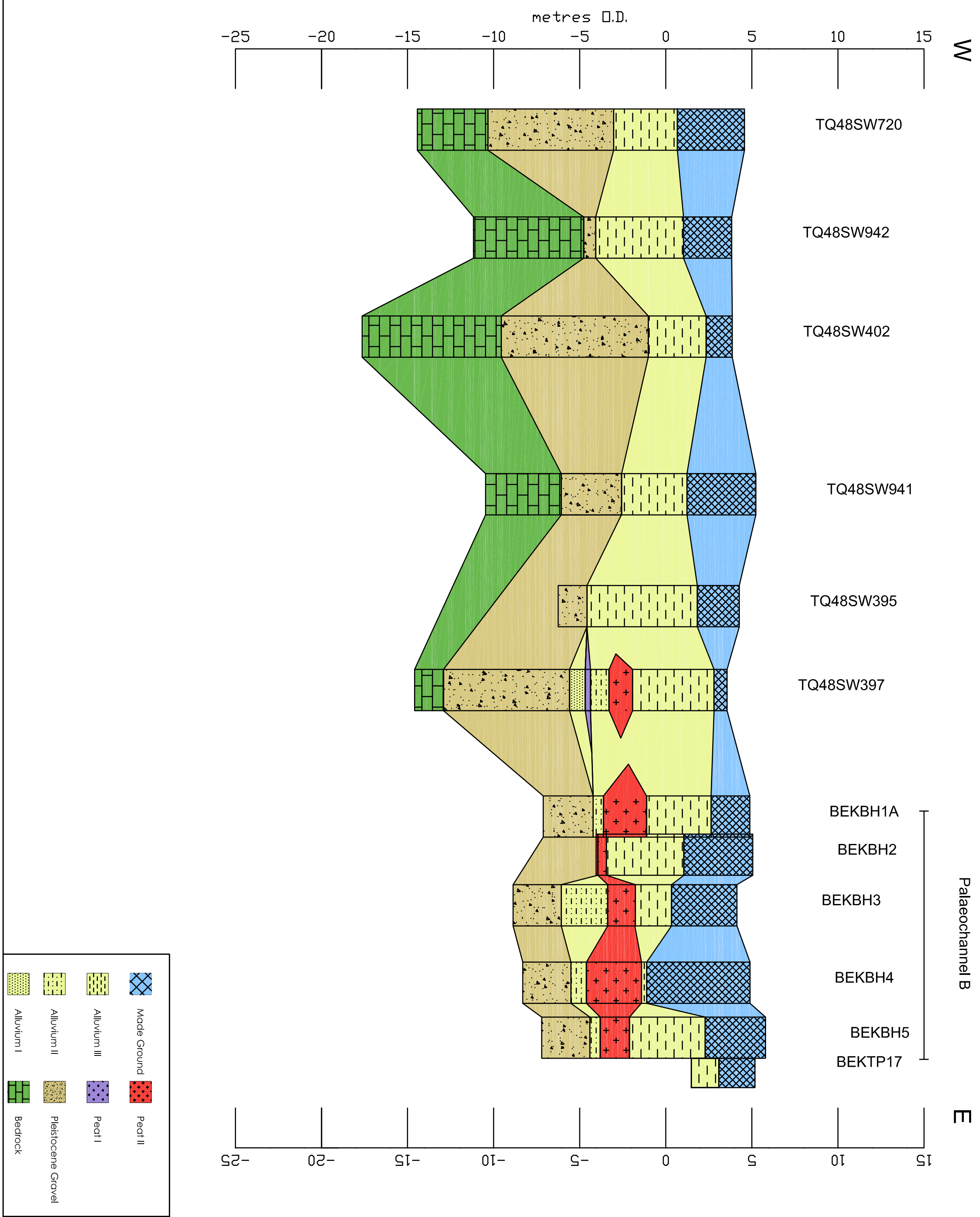

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Figure 7 - Section 2: East - West cross section through two paleochannels located within Beckton Gas Works

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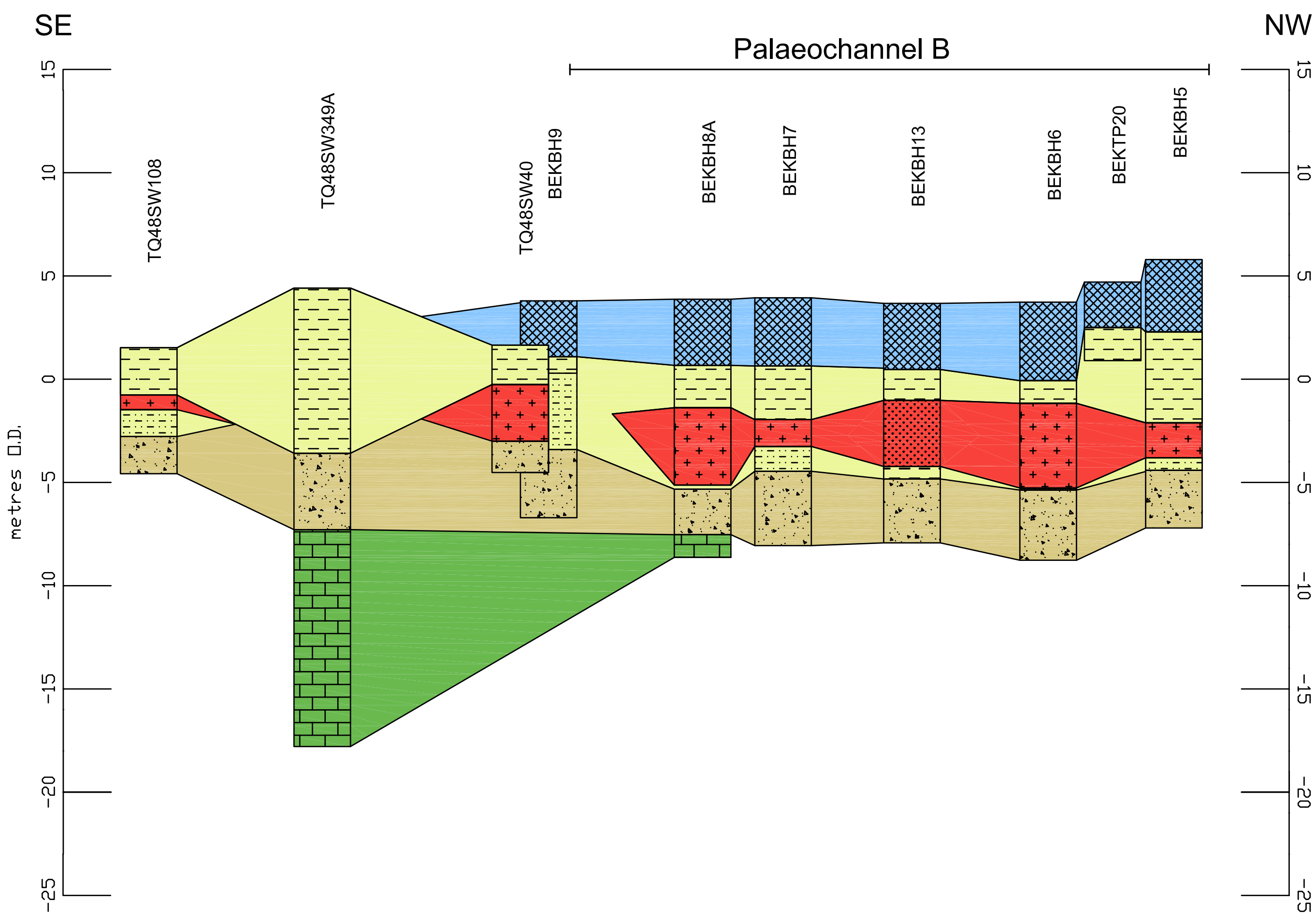

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Figure 8 - Section 3: NW - SE cross section through the Beckton Gas Works

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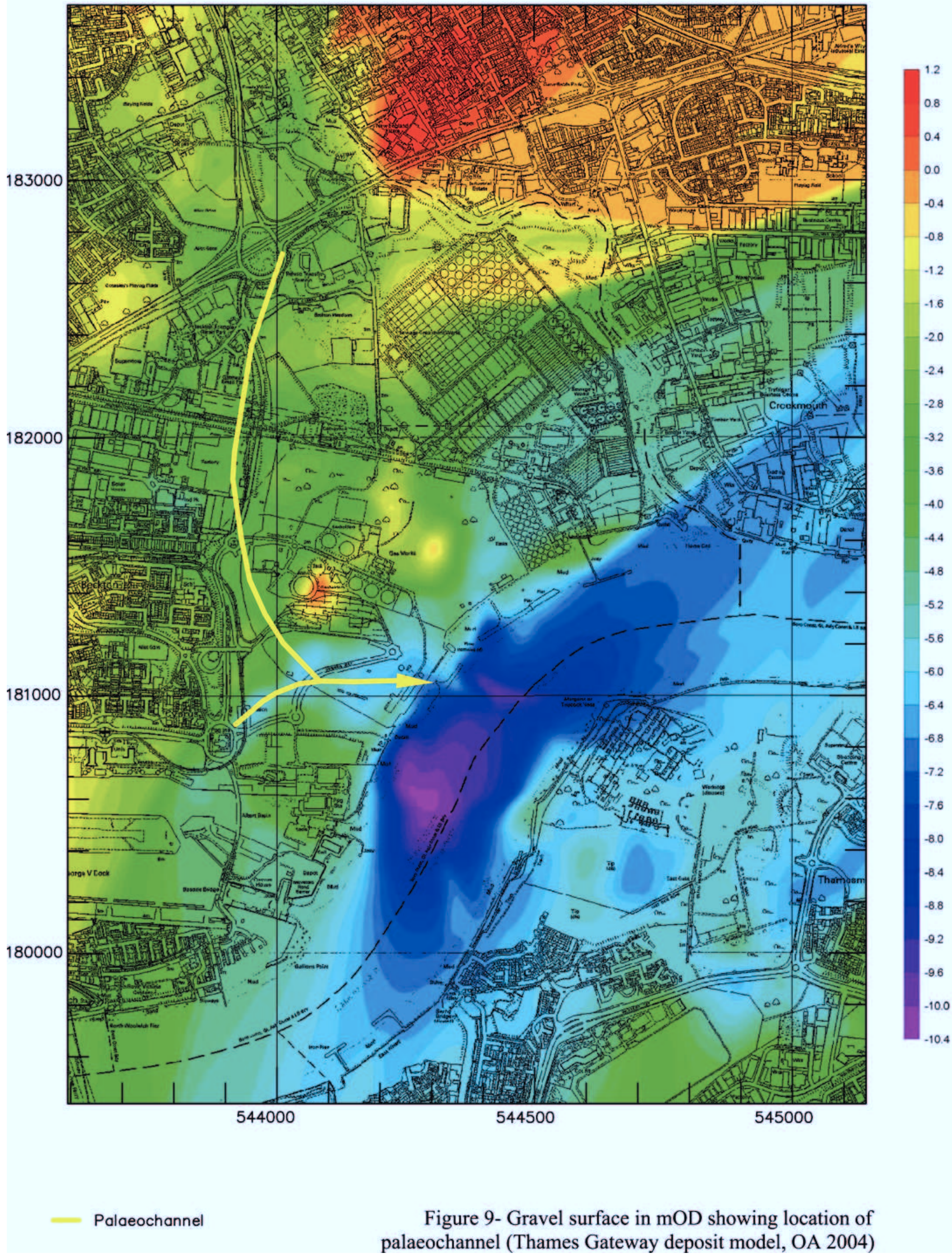

Figure 9- Gravel surface in mOD showing location of palaeochannel (Thames Gateway deposit model, OA 2004)

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