# Multi-Disciplinary Consultant Package 4

# PLANNING AND ENVIRONMENT

## Package Specific WSI Deliverable
## DDBA Plumstead Portal

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## Contents

# 1 Executive Summary

This assessment represents a commitment to providing early advice to establish the Cultural Heritage Resource of the site and surrounding study area. MDC4 has been appointed by CLRL to undertake an archaeological Detailed Desk Based Assessment (DDBA) covering the proposed railway portal at Plumstead as part of the Crossrail development.

The portal site lies within the London Borough of Greenwich and is located above the existing railway line, to the east of White Hart Road approximately centred on NGR 545546,178885. The surrounding land uses include commercial and residential areas. Residential areas lie to the south of the surface route alignment, centred along Plumstead High Street (A206).

The Greater London Sites and Monuments Record (GLSMR) identifies 24 entries within the study area. The study area, a radius of 750m, also includes an **Area of Archaeological Potential**, but this does not extend to the Crossrail site, which lies 160m to the north. No findspots or monuments lie within the footprint of the site although White Hart Depot and its associated buildings are located to the north-west of the proposed development; however they are Listed Buildings and are therefore beyond the remit of this report. There are no non-designated buildings within the SMR.

The Plumstead Portal site has high potential for palaeo-environmental and topographic evidence within the alluvium and Head deposits, and for post-medieval quarry pits. There is moderate potential for prehistoric activity at the wetland/dry land interface, medieval and later land management on the edge of the floodplain, and low potential for both Palaeolithic remains beneath Head deposits and for Roman or later occupation. Any *in situ* Palaeolithic remains, or prehistoric structures such as timber trackways, would be of high importance. All other remains are of moderate importance except for isolated Roman and later remains, which are of low importance (Archaeological Impact Assessment. 2005. p104)

The Deposit Model and supporting report show that insufficient information is available to determine the archaeological and palaeoenvironmental potential for the higher areas of gravel between 94800E and 95100E. The wetland/dryland marginal zone between 95100E and 95300E may be of considerable archaeological significance with the potential for a wide range of evidence documenting human activity from the Neolithic onwards. For much of the route corridor a relatively consistent pattern of Holocene sediments rest on the gravel topographic template. Occupation of such areas is considered unlikely although chance finds cannot be ruled out. Of greater significance are the edges of the peat zones and their relationship with the adjacent minerogenic sequences. The possibility that weathered surfaces contemporary with peat development may occur within the minerogenic sequences should be noted. If present these may well have associated human activity on them.

The deep shafts are likely to require localised archaeological excavation and probably an archaeological watching brief. With this mitigation, no significant residual impacts are predicted (Supplementary Environmental Statement 2, 2006. p380). To mitigate the potential impacts of the services diversions, the incorporated mitigation measures will be implemented as set out in the main ES, Volume 1, Chapter 3, (paragraph 3.7.13 onwards), to produce preservation by record.

# 2 Introduction

## 2.1 Project Background and Site Location

MDC4 has been appointed to undertake a Detailed Desk Based Assessment (DDBA) covering the proposed Plumstead Portal as part of the Crossrail development.

Crossrail is a new cross-London rail link project which will provide transport routes across the southeast of England and London. The line will provide a range of both new and improved rail journeys across London and its immediate surroundings. The proposed development will include the construction of seven stations within central London which will have interchange with other public transport modes including the London Underground, National Rail and the London Bus service; the development will also include the renewal and/or upgrade of existing stations outside central London. The route itself will link Maidenhead and Heathrow in the west with Shenfield in the north-east and Abbey Wood in the south-east. As part of these works a portal at Plumstead will be required.

The Plumstead portal site lies within the London Borough of Greenwich and was originally located on land at Plumstead goods yard, NGR 545240, 178860 (**Figure 1**). However, the portal was realigned approximately 300 m further east in the Amendment to Provision 4 – AP4 (Amendment to Provision 4, May 2007) and now centres on approximately NGR 545546,178885. (The Sites and Monuments Record study area still centres on the original portal location).

The surrounding land uses include commercial and residential areas. Residential areas lie to the south of the surface route alignment, centred along Plumstead High Street (A206) (ES, 2005. p436).

## 2.2 Proposed Development Summary

In the revised scheme, Plumstead portal has moved further eastwards (Amendment of Provisions 4, May 2007). The tunnel eye of the Plumstead portal will now be relocated to a point 25m east of White Hart Road and as a result, a new bridge for White Hart Road over the Crossrail tracks as proposed in the main ES is no longer required. The cut and cover box for the portal will be constructed below ground level, with the bored tunnel commencing at a point approximately opposite Barth Mews. The end of the portal structure will be at a point approximately opposite 161 Marmadon Road. The approach ramp of the portal structure will continue until the Crossrail tracks have risen to ground level, and then run between the eastbound and westbound North Kent Lines, which will be reconfigured to accommodate the Crossrail tracks and provide a four track arrangement from here to Abbey Wood station (Amendment of Provisions 4, May 2007). The diversion of gas, water, electricity, and sewer utilities will also be required in the construction of the portal (refer to SES2 Utilities Mapping SE6).

## 2.3 Reporting Limitations

- The report has been prepared under the express instructions and solely for the use of CLRL.

- All work carried out in preparing this report has utilised and is based upon MDC4's professional knowledge and understanding of current (2008) relevant United Kingdom standards and codes, technology, and legislation. Changes in these areas may occur in the future and cause any conclusions, advice, recommendations or designs contained in this report to become inappropriate or incorrect. MDC4 does not accept responsibility for advising CLRL or any other interested parties of the facts or implications of any such changes in the future.

- This report has been prepared utilising factual information obtained from others. MDC4 take no responsibility for the accuracy of such information.

- This report represents an early stage of a phased approach to assessing the archaeological and cultural heritage resource of the site and study to allow the development of an appropriate mitigation strategy, should this be required. It does not comprise mitigation of impacts in itself.

# 3 Aims and Objectives of Assessment

It is in the interest of the local community, the developer and the Local Authority that archaeological and cultural heritage issues are discussed, with an appropriately trained specialist, at an early stage in the planning process. This assessment represents a commitment to providing early advice to establish the Cultural Heritage Resource of the site and surrounding study area.

The aims of this Detailed Desk Based Assessment were therefore to:

- Identify archaeology and cultural heritage constraints (including planning constraints) within and in the immediate vicinity of the site;
- Assess the baseline conditions and offer an analysis of the extent, preservation, sensitivity, potential and importance of the recorded cultural heritage resource within the site;
- Assess the baseline information and offer an analysis for the potential that unrecorded archaeology/cultural heritage remains survive within the site;
- Assess the potential impacts upon the known and currently unknown archaeological resource, taking into account the severity of the impacts and the importance of the resource, and;
- Propose a programme of further works and / or suitable mitigation measures to avoid, reduce or remedy any adverse impacts caused by development, if required.

The specific traits of a DDBA differentiating if from a standard DBA include:

- The use of extensive, new data from site specific surveys or additional documentary searches.
- Qualitative level of analysis, detailed by site.
- Reporting with detailed factual statement and scope for WSI (Written Scheme of Investigation), with interpretative site deposit model and detailed plan and with outline costs and scope of mitigations.

# 4 Methodology and Sources

## 4.1 Methodology

This assessment was conducted with regard to standards set out by the Institute of Field Archaeologists (IFA).

Information was obtained for study area extending 750meters radius from the original centre point of the site, at OS grid-point 545240, 178860 (**Figure 2**). The scope of resources examined included statutorily designated cultural heritage sites such as Scheduled Monuments and Conservation Areas (Listed Buildings are not covered under the scope of this report), above ground non-designated built heritage features, as well as features of the cultural heritage resource recorded on the Greater London Sites and Monuments Record (GLSMR).

The general approach and methodology has been to consider the effects on the cultural heritage resources including Archaeological Sites and Monuments (including palaeo-environmental deposits assessed by means of a deposit model) – potential destruction or damage to sites and monuments due to permanent or temporary landtake and / or physical intrusion and indirect effects, such as changes to the drainage pattern.

These resources may be nationally or locally designated (by Registration or Scheduling), may appear in the national or local archaeological record, or may be identified from specialist scrutiny of the landscape and historic records.

A gazetteer listing the known cultural heritage resource within the study area was compiled and is provided in **Appendix 1**. Each entry has been marked on a cultural heritage features map (**Figure 2**) and discussed in the text. In addition this report includes a map regression study.

In summary the work has involved:

- identifying the sources available for consultation;
- assembling, consulting and analysing the available resources;
- consulting specialists as appropriate and;
- preparing the written report.

## 4.2 Sources

Amendment to Provision 2 Environmental Statement - May 2006

Amendment to Provision 4 Environmental Statement - May 2007

Archaeology Programming Assessment. November 2006

Crossrail Environmental Statement. February 2005

Crossrail Archaeology Programming Assessment, November 2006.

Crossrail MDC4 Archaeology Updated Baseline Assessment, January 2008

Crossrail MDC4 Archaeology Overview of ground Levels and Land Raising around the Docks in the MDC4 area January 2008

Crossrail MDC4 Archaeology – Geoarchaeological Deposit Model: North Woolwich Portal. January 2008

Deposit Model and Summary Note Plumstead, January 2008 (Appendix 2 &3)

Historic maps including Andrews Dury Herbert, Chapman and Andre, and Ordnance Survey

Supplementary Environmental Statement 2 (SES2). January 2006

Technical Report – Assessment of Archaeology Impacts, Part 4 South-east Route Section. February 2005

MoLAS. The Holocene Evolution of the London Thames, Archaeological Excavations (1991-1998) for the London Underground Limited Jubilee Line Extension Project.

Victoria County History, Essex Vol 6

- SES & APS:
- SES 1- No relevant changes to Plumstead
- SES3 & SES3 Erratum - No relevant changes to Plumstead
- SES4 - No relevant changes to Plumstead
- Amendment to Provision 1 - Jan 2006 - No relevant changes to Plumstead
- Amendment to Provision 3 - Nov 2006 - No relevant changes to Plumstead

# 5 Results

## 5.1 Statutory and Non-Statutory Protected Features

No Scheduled Ancient Monuments are situated within the search area, although a possible prehistoric burial mound on Winn's Common, Plumstead overlooks the site from the ridge c 1km to the south (Scheduled Ancient Monument LO 132).

The search radius includes an Area of Archaeological Potential, but this does not extend to the Crossrail site, which lies 160m to the north. There are no non-designated structures within the GLSMR, although there are Listed Buildings (which are beyond the remit of this report).

## 5.2 Sites and Monuments Record (SMR)

The local SMR, held by the Greater London Sites and Monuments Record (GLSMR) was consulted to establish if any additional non-designated Archaeological findspots and sites or cultural heritage remains were recorded in their database since the Environmental Statement was written. In total there were 24 entries identified by the GLSMR which are discussed below in the archaeological and historical background section. A gazetteer of these finds can be found in **Appendix 1**.

The report on the updated baseline (Crossrail MDC4 Archaeology – Updated Baseline, 2008. p31) states that there are 2 new pieces of baseline data, neither of which are in the GLSMR:

- AWS05 – Evaluation. Alluvial sequence including Middle-Late Bronze Age peat, providing environmental and topographical data, suggesting dry heath conditions over earlier bog. Palaeochannel (?) running SW to NE. 19th century field drainage or boundary ditch. Outside LLAU/LOD (Land to be Acquired or Used/Limits of Deviation)

- WNG03 – Watching brief. Alluvial sequence including Neolithic to Iron Age Peat. Outside LLAU/LOD

## 5.3 Geology, Topography and Palaeoenvironment

To the east from Plumstead High Street, the route leaves the edge of head deposits (eg soliflucted chalk) on higher ground at c5m OD, and crosses alluvium of the former Thames marshes, where street level falls to c2m OD.

This area of the Crossrail route is overlooked to the south by a ridge of higher ground, composed of sandstone and mudstone of the Lambeth Group, rising to over 50m OD to the south-east on Plumstead Common. The route itself follows the base of this ridge, where Head deposits have accumulated down-slope over Thanet sandstone. To the north, it overlooks the low-lying land of the Thames floodplain, which it enters east of Plumstead High Street, approaching the proposed Plumstead tunnel portal (Archaeological Impact Assessment, part4, 2005. p7).

The floodplain consists of alluvial silts and peats, representing a wider river bordered by marshes, channels and creeks, prior to reclamation and embanking. These overlie a faster flowing late glacial river regime characterised by terrace gravels. The Plumstead

and Erith marshes form a wide northward projection: the western end of the extensive North Kent marshes that are characteristic of the lower Thames and Medway estuaries (Archaeological Impact Assessment, part4, 2005. p7).

Preliminary analysis of recent Crossrail boreholes indicates that there are two areas of Mesolithic potential (one covering the western c 100m+ of the portal and surrounding worksite, the other the eastern c210m+ of the portal ramp and surrounding worksite), and a band of Bronze Age potential which covers most of the remainder of the portal site and worksites (Archaeology Programming Assessment, 2006. p145).

The existing ground levels for Plumstead Portal itself are as follows:

- Track bed and embankment (eg portal): General track level: c 3.5m OD
- Main Plumstead Worksite (existing railway depot, west of White Hart Road): rises from c 1m OD to c 3m OD, from east to west
- Worksite along track: Varies between c 1m OD at the west to c 3m at the east
- The surrounding ground levels lie between 4m OD to the south dropping to 2m OD to the north
- The existing railway runs along an embankment up to 2.5m high. The western part of the existing railway depot west of White Hart Road appears to have been raised up to the same level.

Preliminary consideration of the Crossrail boreholes in this area suggests that the portal runs across the indented edge of higher ground rising to the south. Therefore, the overall levels quoted below only form a very general guide, the Deposit Model (January 2008) should be referred to for a more detailed understanding (**Appendix 3**).

Overall, in situ alluvium has been recorded at c 0.5 to c 2.5m OD, with thickness varying significantly across the site (WP24P, WP21, WP25R, etc).

The top of the natural gravels lies between c –2.5 and c 1.5m OD (WP24P, WP27R, etc), with the Thanet Sandstone rising further to the south.

## 5.4 Deposit Modelling

Insufficient information is available to determine the archaeological and palaeoenvironmental potential for the higher areas of gravel between 94800E and 95100E. Test pit or borehole information is required from these deposits should there scheme impact in this area.

The wetland/dryland marginal zone between 95100E and 95300E may be of considerable archaeological significance with the potential for a wide range of evidence documenting human activity from the Neolithic onwards. Such evidence will only be identified through purposive trenching through these sequences if scheme impact necessitates.

For much of the route corridor a relatively consistent pattern of Holocene sediments rest on the gravel topographic template. Occupation of such areas is considered unlikely although chance finds cannot be ruled out. Of greater significance are the edges of the peat zones and their relationship with the adjacent minerogenic sequences. The possibility that weathered surfaces contemporary with peat

development may occur within the minerogenic sequences should be noted. If present these may well have associated human activity on them. The only evidence for a topographic high (island) within this floodplain is the slight rise in the topographic template between 95000E and 95750E. Evidence for human activity on this topographic rise may be addressed through test pitting. Elsewhere the recovery of boreholes for sequence assessment should be considered through sequences containing peats and those without.

Refer to **Appendix 2** for the full report and **Appendix 3** for the deposit model.

## 5.5 Previous Excavation or Survey

The GLSMR identifies several previous geoarchaeological evaluations and excavations. These include:

- **ELO219** – watching brief at Parkdale Road Flood Alleviation in 2001 (associated monuments – **MLO75717**)

- **ELO1335**- archaeological evaluation at Tom Cribb Road in 1993 (associated monuments - **MLO76844, MLO76843**).

## 5.6 Chronological Summary/Archaeological and Historical Background

This section provides a brief overview of the archaeological background of the study area which will aid understanding of the likelihood of encountering currently unrecorded resources within the application site and potentially determine their significance and likely condition.

### 5.6.1 Prehistoric Period (c 500,000*BP* – AD50)

Despite there being no GLSMR entries within the study area dating from the prehistoric period, there is evidence of Palaeolithic, Mesolithic, Bronze Age and Iron Age presence in the areas surrounding the Plumstead Portal.

There were a small number of Palaeolithic flint tools, found on the higher ground overlooking the Thames floodplain, suggesting the potential survival of Palaeolithic evidence in the area (Archaeological Impact Assessment, part4, 2005. p7).

Mesolithic peat deposits and flint tools have been found in Woolwich; it is likely that this area would have attracted Mesolithic groups due to an environment which was friendly to fishing, hunting, and fowling and the provision of plant resources (Archaeological Impact Assessment, part4, 2005. p7).

Again, although there is no evidence for Bronze Age occupation within the study area finds from this period have been found in the locality. For instance a concentration of what are believed to be Bronze Age round barrows lies c 1 to 1.8km south of the Crossrail route, on Shooter's Hill and Plumstead Common, in a prominent position overlooking the Thames (Archaeological Impact Assessment, part4, 2005. p8).

Likewise an Iron Age settlement was found where the promontory of higher ground reaches the Thames, at the Woolwich Power Station site; it has been interpreted as a hill fort or oppidum (fortified proto-town), which may have served as a centre for

administration and trade over a wide area. There is however little other evidence to date for Iron Age activity in the surrounding area (Archaeological Impact Assessment, part4, 2005. p8).

Overall archaeological potential: low for Palaeolithic evidence (in areas of Head deposits); moderate for Mesolithic and high for supporting palaeo-environmental sequences (in areas of alluvium) (Archaeological Impact Assessment, part4, 2005. p7).

### 5.6.2 Roman Period (AD50-450)

The Roman landscape was dominated by two roads. On the ridge to the south, the route of the major arterial road from Dover to London, Watling Street, is marked by modern Shooter's Hill. A second, subsidiary route followed the lower slopes towards Woolwich, along what is now Plumstead High Street. The projected road alignments north and south of the river raise the possibility of a Roman ferry crossing at Woolwich. There was certainly a significant settlement here, the extent of the cemetery beside the road in the vicinity of Plumstead Road and the Royal Arsenal suggesting relatively dense Roman occupation. A series of settlements along the roads is likely, with villas and farmhouses occupying the fertile Cray and Darenth valleys c 9km to the east of Woolwich (Archaeological Impact Assessment, part4, 2005. p8).

It also seems that the marshes on both sides of the Thames were being reclaimed, with farming settlements occupying slightly higher areas within the floodplain. Pottery, burials and the foundations of buildings were reported in the late 19th century from the Erith and Plumstead marshes (Archaeological Impact Assessment, part4, 2005. p8).

The GLSMR identifies several findspots dating to the Roman period. These include 8 coins:

- **GLSMR 070280/00/00 –** found at Plumstead High Street, a coin of Constantine second, mint of Treves 333AD.
- **GLSMR 070278/00/00 –** found at Plumstead High Street, a coin of Constantine.
- **GLSMR 070214/00/00 –** found at Plumstead High Street, a coin of Constantine, London mint.
- **GLSMR 070387/00/00 –** found at Kentmere Road, a coin of Constantine first – 308-357 AD.
- **GLSMR 070313/00/00 –** found at Ceres Road, possibly a coin of Valentinian, c365-378 AD.
- **GLSMR 070319/00/00 –** found at Plumstead, coin of Antonius Pius, 138-161 AD.
- **GLSMR 070314/00/00 –** found in the garden of 137 Plumstead High Street, coin on Constantius II, mint of Constantinople 351-354 AD
- **GLSMR 070256/00/00 –** found at Plumstead High Street, coin of Lucius Verus.

Other finds in the study area include a fragment of a slide key (**GLSMR 070322/00/00**) found in Plumstead and a human internment (**GLSMR 071062/00/00**), mentioned in an article, found in Plumstead High Street with several Roman coins.

**Low potential** for Roman and later occupation.

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**Low potential** for Roman and later occupation.

### 5.6.3 Medieval Period (450-1540)

The late Saxon and medieval village of Plumstead lay along the High Street, focused around the church and manor house, at the junction with Church Manor Way to the south of the Crossrail route (**GLSMR 070291, 223570**). However, as late as 1888, the Ordnance Survey shows the existing railway passing through undeveloped open land between the village and Plumstead marshes to the north. The potential medieval remains are mainly for land reclamation and agricultural features, such as drainage ditches, embankments and field systems (Archaeological Impact Assessment, part4, 2005. p65).

The GLSMR has identified four findspots dating from the medieval period these include 2 fragments of rowel spurs (**GLSMR 070363/00/00** & **070364/00/00**) found in Plumstead; an iron dagger with riveted handle tang (**GLSMR 070356/00/00**) and a silver penny of Edward II, London Mint (**GLSMR 070355/00/00**).

Overall archaeological potential: **moderate.**

### 5.6.4 Post Medieval (1540-1900)

Land reclamation was a feature of the area during the medieval and post-medieval periods, although high tides still caused the river to flood the surrounding land. The Crossrail route passes through what was until the 19th century open land between Plumstead village and the marshes to the north. Features relating to this rural landscape such as embankments, drainage ditches, and field systems are therefore to be expected (Archaeological Impact Assessment, part4, 2005. p9).

Because of the proximity to the river, the agricultural landscape had industrial elements, particularly the exploitation of natural resources such as gravel quarrying and brick making. The industrialisation of the riverfront began with ship-building and the establishment of the Tudor royal dockyard at Woolwich. The significance of economic pressures, particularly from the north as industrial Woolwich expanded, can be seen in the resistance to development and enclosure of the commons in the area as late as the 1870s, when troops were used to quell riots over this issue (Archaeological Impact Assessment, part4, 2005. p9).

The GLSMR identified many post medieval entries within the study area. These include several entries relating to non-designated buildings – former and extant.

The foundations of a house were discovered on Banares Road in the area near St Nicholas Church (**GLSMR 070291/00/00**). During an archaeological evaluation at Tom Cribb Road (**ELO1335**) made ground was truncated by the fragments of wall foundations and a 20$^{th}$ century drain cut, a 19$^{th}$/20$^{th}$ century basement was also found (**MLO76844**). 18$^{th}$ to 19$^{th}$ century made ground was also identified during this evaluation (**MLO76843**).

The site of a landfill (**GLSM 071728/00/00**) falls within the study area; its location was taken from the British Geological Survey data. It is not known whether this site was man made or worked land, the date is unknown although all are of 19th/20th century data.

Brickfield at Elmley Street (**GLSMR 071788/00/00**) was identified on the 1st edition Ordnance Survey Maps.

Unclassified deposit (**MLO75717**) identified during a watching brief (**ELO219**) at Parkdale Road flood alleviation.

**High potential** for post-medieval activity, particularly gravel and brick quarry pits.

#### 5.6.5 Modern (1900+)

The only entries dating to the modern period are White Hart Depot Power Station and associated buildings; however, these are listed buildings and are therefore beyond the remit of this report.

#### 5.6.6 Unknown

There are several records identifying undated entries in the GLSMR. These include:

- Foundations recorded on Plumstead Marshes (**GLSMR 071063/00/00**) – the GLSMR states that they are of 'vague character' and that there is some confusion with the source material meaning this site could in fact be the same as another set of foundations in Bexley.
- A findspot of a coin (**GLSMR 071064**) from Plumstead Marshes of unknown date was found within the study area.
- Human remains, of unknown date, were found on Plumstead Marshes (**GLSMR 071065/00/00**).
- Negative evidence of unknown date (**GLSMR 071295/00/00**) was identified during an evaluation and watching brief in.

## 5.7 Map Regression

A search was undertaken of a range of Historic Survey Maps covering the study area. The progressive maps document the history and development of the site and its environs, as well as changes in settlement and land use within the wider study area. The Ordinance Survey (OS) Maps examined dated from 1799 to 1899, while the earliest non OS map of relevance to this assessment was the 1769 Andrews Dury Herbert Map. Refer to **Appendix 4** for historic maps.

**1769 Andrews Dury Herbert Map –** this map shows that the village of Plumstead is present in the middle of the study area, with the houses arranged along the main road. A watercourse runs from the River Thames directly south across the western edge of the Plumstead study area. Mounds/barrows are shown to the south of the site, and one

is marked within the study area adjacent to the River in the west and several smaller ones are to the east. Much of the land north of the site is undeveloped fields.

**1799 Ordnance Survey Map** – this map shows a close up of Plumstead. The area surrounding Plumstead, arranged along a main road, is still undeveloped fields. Two barrows are marked, both to the east, one of which is adjacent to the church.

**1844 Ordnance Survey Map** – this map shows that the North Kent railway line has now been developed north of Plumstead. The land above that remains undeveloped marshland labelled as Plumstead Marshes.

**1899 Ordnance Survey Map** – this map shows that the footprint of the portal is still undeveloped. The area south-west of the railway line has become densely built up with residential buildings, roads and schools. The land to the south-east of the railway line, and the land to the north are undeveloped.

## 5.8 Evidence for recent or previous truncation/disturbance to archaeological horizons

There are standing buildings/structures within the existing railway depot west of White Hart Road. Although it might seem unlikely that these would have basements, the effect of these, if any would depend on the depth of land raising at the location of a basement.

Unlikely as the railway is on an embankment; any impacts would be limited to topsoil stripping in advance of its construction - which would not affect deep alluvial deposits (Crossrail Archaeology MDC4: Levels Overview, 2008. p5).

# 6 Discussion

## 6.1 Baseline Data Summary and Research Agenda

There are 24 GLSMR entries within the study area for the Plumstead portal. These include Roman to medieval findspots; and post medieval building foundations, brickfields and a landfill. There no entries dating from the prehistoric period or the modern (other than Listed Buildings).

The map regression shows that although Plumstead Village was present on the 1769 Andrews Dury Herbert Map, the site footprint and study area remained undeveloped other than the North Kent railway line.

The archaeological potential of the area gives rise to several prospective research agendas. These have been generally identified in the technical note on the Assessment of Archaeological Impacts, 2005. Research areas considered specific to Plumstead include:

- Identifying the industries that especially represented London
- Understanding the relationship between landscape, river and settlement, and the influences of the Thames in particular on communication and social interaction.
- Understanding the relationship between the Bronze Age wooden trackways and the settlement to which they presumably led, and what the trackways represent in terms of woodcraft and woodland management.
- Understanding the nature and meaning of the deposition of metalwork in the Thames and at the headwaters of river tributaries.
- Understanding the differences, if any, between burial practices in the city and outlying cemeteries.

## 6.2 Impacts

The relocated portal will have a similar impact to that reported in the main ES for the original location (Volume 3, Chapter 11, Section 11.9, paragraphs 11.9.36 to 11.9.38). The revised works for the portal will completely remove potential archaeological remains, as will those associated with the new Plumstead shaft. The sewer diversions and protective works to services beneath White Hart Road will have a similar impact to that reported in Supplementary Environmental Statement 2 (SES2) (Chapter 30, Section 30.5, paragraphs 30.5.2 to 30.5.3), although with the revised scheme the extent of the works is likely to be reduced (AP 4, May 2007).

Two deep shafts will completely remove archaeological remains within their footprints. The diversion of gas, water, electricity, and sewer utilities has potential to partially remove archaeological remains (Supplementary Environmental Statement 2, 2006. p380).

In addition, works such as the North Kent Line track realignments, embankments, noise barriers, conveyor footings, structures in the construction compounds, particularly in the Plumstead Worksite West, and service diversions are likely to partially remove potential archaeological remains, and completely remove them within deep groundworks (Archaeological Impact Assessment, part1, 2005. p103).

The impact of these works would be of high magnitude before mitigation, with potential for a significant impact. The incorporated mitigation measures would constitute preservation by record, producing no residual impact (Archaeological Impact Assessment, part1, 2005. p103).

## 6.3 Mitigation and Residual Impacts

At all of these locations, preservation by record would be the most appropriate form of mitigation for archaeological remains of this type in this location. With this mitigation, no significant impacts will occur (ES Vol3, 2005. p444).

For non-listed industrial archaeological remains, the mitigation will include adjustment of the detailed design for the worksite and/or suitable protective measures, to preserve the remains in situ, as described in Amendment of Provisions 2 (AP2) (Chapter 8, Section 8.14, paragraph 8.4.16). Mitigation measures for other remains will be preservation by record, as in set out in the main ES. With this mitigation, no significant residual impacts will occur (AP 4, May 2007).

The baseline resources are described in the main ES, Volume 3, Chapter 11, with the addition of the southern outfall sewer which dates to 1862 and was assessed as being of low importance. To mitigate the potential impacts of the services diversions, the incorporated mitigation measures will be implemented as set out in the main ES, Volume 1, Chapter 3, (paragraph 3.7.13 onwards), to produce preservation by record. The deep shafts are likely to require localised archaeological excavation and probably an archaeological watching brief. With this mitigation, no significant residual impacts are predicted (Supplementary Environmental Statement 2, 2006. p380).

The Deposit Model and supporting report show that insufficient information is available to determine the archaeological and palaeoenvironmental potential for the higher areas of gravel between 94800E and 95100E. The wetland/dryland marginal zone between 95100E and 95300E may be of considerable archaeological significance with the potential for a wide range of evidence documenting human activity from the Neolithic onwards. For much of the route corridor a relatively consistent pattern of Holocene sediments rest on the gravel topographic template. Occupation of such areas is considered unlikely although chance finds cannot be ruled out. Of greater significance are the edges of the peat zones and their relationship with the adjacent minerogenic sequences. The possibility that weathered surfaces contemporary with peat development may occur within the minerogenic sequences should be noted. If present these may well have associated human activity on them.

Where the potential geoarchaeological deposits are likely to be impacted upon by the scheme proposals an appropriate mitigation method statement will be developed.

# 7 Recommendations

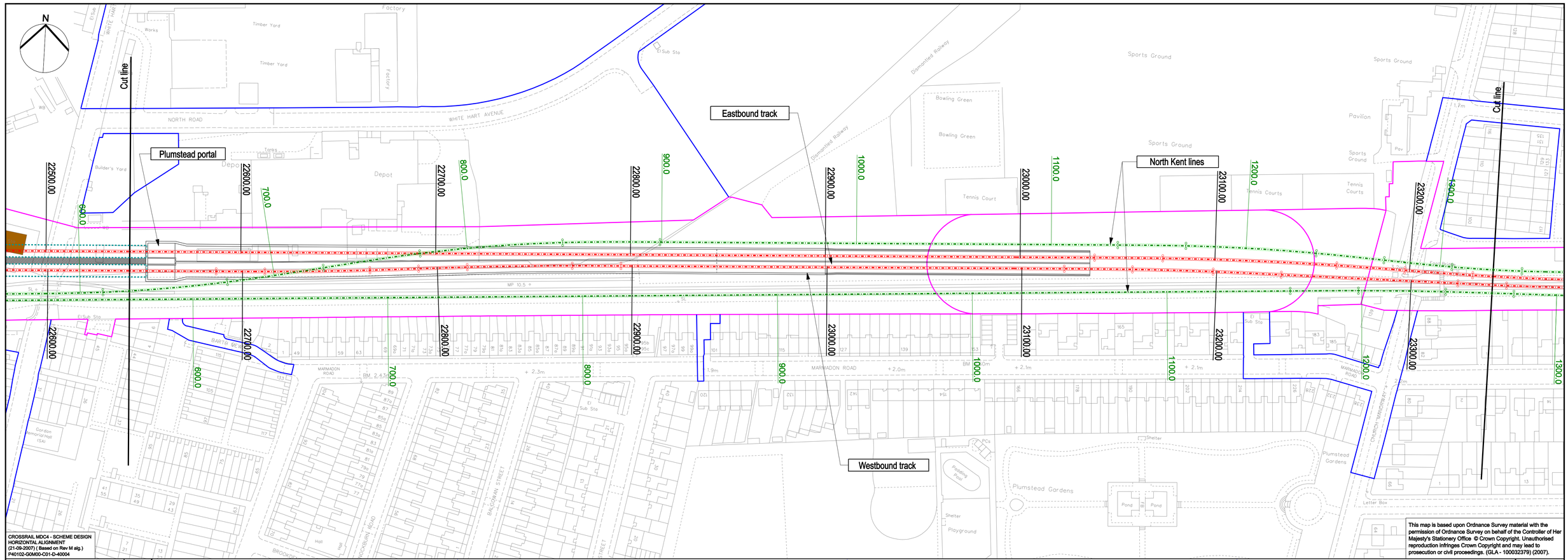
The deep shafts are likely to require localised archaeological excavation and probably an archaeological watching brief. With this mitigation, no significant residual impacts are predicted (Supplementary Environmental Statement 2, 2006. p380). To mitigate the potential impacts of the services diversions, the incorporated mitigation measures will be implemented as set out in the main ES, Volume 1, Chapter 3, (paragraph 3.7.13 onwards), to produce preservation by record.

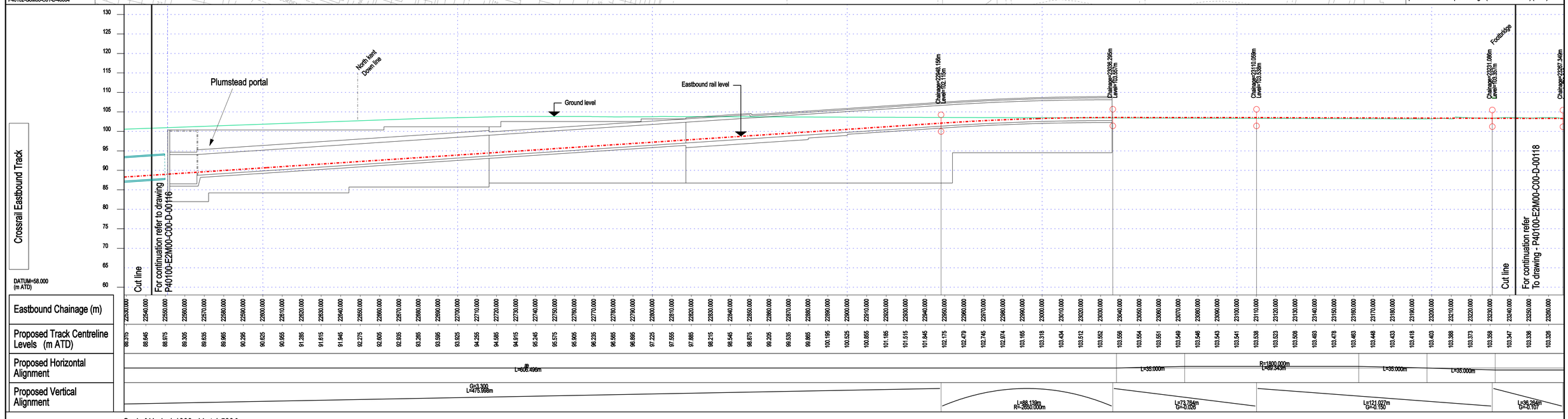
Mitigation proposals will be detailed in the subsequent WSI.

# 8 Figures

Figure I Plumstead 2 P40100-E2M00-C00-D-00117.pdf

Figure 2 PLU_GLSMR_211207_LOCATIONS.pdf

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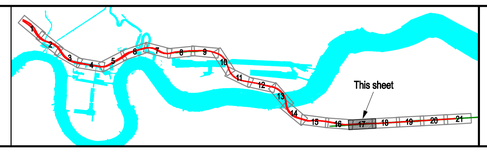
CROSSRAIL MDC4 - SCHEME DESIGN
VERTICAL ALIGNMENT - 1:2
(21-09-2007) ( Based on Rev M alg.)
P40102-G0M00-C01-D-40005

| REV | DATE | DESCRIPTION | BY | CHKD | APP | CAD | ACC |
|---|---|---|---|---|---|---|---|
| A | 15/11/06 | INITIAL REFERENCE DESIGN | ARN | MB | RPM | | |
| B | 30/11/06 | INITIAL REFERENCE DESIGN UPDATED | ARN | MB | RPM | | |
| C | 20/11/07 | SCHEME DESIGN ISSUE | ARN | MB | RPM | | |

KEY :
- LLAU
- LOD




Scale 1:1000
20m 0 20m 40m 60m 80m 100m
Scale 1:500
10m 0 10m 20m 30m 40m 50m

SUSPECTED PILED FOUNDATION | PILED FOUNDATION | RAIL/ROAD TUNNELS



CROSS LONDON RAIL LINKS LIMITED
PORTLAND HOUSE
BRESSENDEN PL.
LONDON SW1E 5BH
TEL : 020 3023 9100
www.crossrail.co.uk


1. Confirmation of all survey data must be obtained from the Crossrail survey team.
2. Coordinates to the London Survey Grid, heights to the London height datum which is 100 metres below Ordnance Datum Newlyn. See Crossrail standard CR-STD-010.

CONTRACT No. / CONSULTANT : 1200 / HALCROW

DRAFT

TITLE :
PLAN AND PROFILE
EASTBOUND
SHEET 17 OF 21

| SCALE : | DRAWING AND CAD FILE No : | REV : |
|---|---|---|
| 1:1000 @ A1 | P40100-E2M00-C00-D-00117 | C01 |


PLUMSTEAD PORTAL_GLSMR_OS_211207

# Appendix 1 – Gazetteer

| Pref Ref | Name | Mon Type | Date Range | Easting | Northing |
|---|---|---|---|---|---|
| MLO76844 | Tom Cribb Road | Basement, cut, foundation | 19th century to modern 1800 AD to 2000 AD | 544605 | 179004 |
| MLO76843 | Tom Cribb Road | Made ground | 19th Century to Post Modern 1800 AD to 1900 AD | 544605 | 179004 |
| 070363/00/00 | Plumstead | Findspot - spur | Medieval 1066 AD to 1539 AD | 545304 | 178555 |
| 070356/00/00 | Plumstead | Findspot - dagger | Medieval 1066 AD to 1539 AD | 545304 | 178555 |
| 070355/00/00 | 88 Brookdene Rd SE18 | Findspot coin | Medieval 1066 AD to 1539 AD | 545818 | 178709 |
| 070364/00/00 | Plumstead | Findspot - spur | Medieval 1066 AD to 1539 AD | 545304 | 178555 |
| 070291/00/00 | Benares Rd in area of/near St Nicholas Church SE18 | House | Post Medieval 1540 AD to 1900 AD | 545874 | 178604 |
| 071728/00/00 | White Hart Rd | Landfill Site | Post Medieval 1540 AD to 1900 AD | 545304 | 178804 |
| 071788/00/00 | Elmley St | Brickfield | Post Medieval 1540 AD to 1900 AD | 544754 | 178504 |
| MLO75717 | Parkdale Road Flood Alleviation | Deposit unclassified | Post Medieval 1540 AD to 1900 AD | 545265 | 178475 |
| 070256/00/00 | Plumstead High St SE18 | Findspot - coin | Roman 43 AD to 409 AD | 545604 | 178504 |
| 070314/00/00 | 137 Plumstead High St (garden of) SE18 | Findspot - coin | Roman 43 AD to 409 AD | 545399 | 178580 |
| 071062/00/00 | Plumstead High Street | Human remains, inhumation | Roman 43 AD to 409 AD | 545604 | 178504 |
| 070280/00/00 | Plumstead High Street | Findspot - coin | Roman 43 AD to 409 AD | 545604 | 178504 |
| 070319/00/00 | Plumstead | Findspot - coin | Roman 43 AD to 409 AD | 545304 | 178504 |
| 070313/00/00 | Ceres Rd SE18 | Findspot - coin | Roman 43 AD to 409 AD | 545704 | 178575 |
| 070322/00/00 | Plumstead | Findspot - key, locking | Roman 43 AD to 409 AD | 545304 | 178504 |
| 070387/00/00 | Kentmere Rd SE18 | Findspot - coin | Roman 43 AD to 409 AD | 545355 | 178655 |
| 070214/00/00 | Plumstead High Street | Findspot - coin | Roman 43 AD to 409 AD | 545604 | 178504 |

| | | | | | |
|---|---|---|---|---|---|
| 070278/00/00 | Plumstead High Street | Findspot - coin | Roman 43 AD to 409 AD | 545604 | 178504 |
| 071063/00/00 | Plumstead Marshes | Building | Unknown | 545504 | 179505 |
| 071064/00/00 | Plumstead Marshes | Findspot - coin | Unknown | 545504 | 179505 |
| 071065/00/00 | Plumstead Marshes | Human remains, burial | Unknown | 545504 | 179505 |
| 071295/00/00 | Tewson Rd | Negative evidence | Unknown | 545649 | 178449 |

# Appendix 2 – Deposit Model Report

**Summary notes: Plumstead Portal**

1.1 These notes have been produced following an investigation of a series of borehole logs provided by the client. No additional information has been gathered from other sources such as the British Geological Survey (BGS) archive or the authors own archive of data (although in both cases significant bodies of information are likely to exist that may shed light on the regional context of the sequences present in the study area). As a consequence the conclusions that can be drawn are limited by the detail provided in the geotechnical records supplemented by observations provided by staff from the Museum of London Archaeology Service who monitored some of the boreholes.

1.2 Three transects have been constructed. The main profile runs west to east along the route of the Cross Rail development. Two transects across this route (southwest to northeast) have also been constructed at the western end of the route corridor. No additional transects have been constructed due to the distribution of the data. Table 1 lists the full data set used in the construction of the individual transects.

| Transect | Data used in construction |
|---|---|
| 1 | HL003, WP28R, HL001, HL002, WP29R, WP27R, WP26R, WP30P, WP25R, WP23R, WP22R, WP21R, WP24P, WP20R, 8500WP16R, BS82, BS83, B408, BS79, WP15R, BS77, B313, WP14R, B312, WP19R, B311, WP13R |
| 2 | B313, BS77, B312, WP14R, WP19R |
| 3 | B500, WP16R, B408, BS83, BS82, WP15R |

**Table 1.** Data used in transect construction

1.3 Transects were constructed using the basic lithology provided in the geotechnical logs. Correlations between boreholes were based on the lithology as well as the authors own experience of lower Thames sequences. Correlations in some places require verification.

**2. Key findings**

2.1 The route corridor is underlain by Thanet Sand along much of the route corridor with elements of the Lambeth Group present at higher elevations towards the western end of the route corridor. Chalk is only present at depth along the route corridor. The distribution of these basement geologies is likely to have an impact on the preservation potential of the route corridor with the preservation of carbonate based materials less likely due to the lower pH of the ground conditions associated with the sandy substrate of the Thanet Sand.

2.2 Coarse sands and gravels underlie most of the route corridor. These vary in thickness from less than 1m (WP19R) to more than 10m (B408). Variation in the elevation of the gravels is also noted. For example the gravels present in WP19R lie at about +10m O.D. while those in BS77, B313, WP14R, B312 lie between -3m and +9m O.D. For much of the route corridor (HL003, WP28R, HL001, HL002, WP29R,

WP27R, WP26R, WP30P, WP25R, WP23R, WP22R, WP21R, WP24P, WP20R, 8500WP16R, BS82, BS83, B408) the gravels lie between c.-2m and -9m O.D. This variation in elevation of the height of the gravels indicates that a number of different gravel bodies are present along the route corridor. It is probable that the main body of gravels resting between -2m and -9m O.D. are equivalent to the Shepperton Gravel (sensu Gibbard, 1994). These are seen to have an undulating surface (higher towards the edge of the marsh and lower out into Plumstead Marshes (see Gibbard, 1994 Figure 45 (b)). These deposits are traditionally dated to the late Devensian. Their potential to produce archaeological material is low while the possibility that palaeoenvironmental remains may be present is slightly higher.

2.3 The higher gravel bodies are more difficult to ascribe to the traditional lower Thames framework. The geomorphological position of the site (close to the eroded south bank of the Thames) has meant that elements of older floodplains in the area have all but been removed and that only small isolated patches (not mapped on the BGS maps of the area) are likely to exist. This is almost certainly the case with the gravels at higher elevations to the west end of the route corridor. It is likely that these gravels are a mix of fluvial and colluvial deposits spanning parts of the Devensian and possibly even belonging to other episodes during the last 200,000 years. Their archaeological and palaeoenvironmental potential will vary depending on the age and contexts of deposition of the gravels. Both archaeological material and palaeoenvironmental remains may occur in these deposits.

2.4 The surface of the gravels along the route corridor represents an important landsurface for the early Holocene (topographic template). Progressive inundation of this landsurface followed sea level rise and the onset of sedimentation on the gravel surface. On the basis of the time depth estimates for this process (Bates and Whittaker, 2004) the lower lying elements of this landscape were probably inundated around 5600 B.P. with higher elements by about 5000 B.P. transforming the local landscape from a dryland to wetland one. The basal gravel surface is likely to have a variety of features preserved on the surface ranging from small streams to depressions occupied by small lakes etc. Evidence for human activity on this landsurface is probably tied to these features and at present with the quantity of data available it is impossible to locate such features and therefore the precise position of areas of high archaeological potential are difficult to define. Only at higher elevations would dryland situations have continued after this inundation. The transition zone between the lower and higher ground (i.e. towards the western end of the route corridor around boreholes BS83 to WP15R) would have been an ecotonal dryland/wetland zone of considerable archaeological interest. At the western end of the route corridor where a dryland/wetland boundary is implied the archaeological potential is high for later Prehistoric (Neolithic/Bronze Age) archaeology.

2.5 Holocene sediments resting on and above the gravel topographic template consist of variable clay and silts with some sands. Also present are organic silts and peats. The Holocene wedge of sediments attain maximum thickness of about 4m in places. Peat deposits typically lie between elevations of 0m and -3m O.D. but these deposits are not laterally extensive and either wedge out laterally being replaced by clay-silt dominated sediments or have been eroded (less likely). These peats are typical of the more extensive peats found across the Thames floodplain at elevations of between -5m and -2m O.D. that date to the Neolithic/Bronze Age and represent an estuary wide

contraction of the brackish environments (e.g. see Long *et al.*, 2000; Bates and Whittaker, 2004). The Holocene sediments thin and wedge out in both directions along the route corridor suggesting the possible presence of an ecotonal dryland/wetland zone of considerable archaeological interest being present at either end of the corridor (it is possible that that at the eastern end of the route corridor simply represents sequences that have been removed by human activity rather than a real thinning and wedging out of sequences). There is no evidence in the boreholes examined that the southern edge of the floodplain exists within the route corridor. Edge marginal zones along the southern boundary of the floodplain are likely to lie south of the route corridor (although tongues of higher ground may protrude northwards into the wetland and may impact on the route corridor in places, at present sampling intervals along the route corridor are insufficient to identify such features).

## 3. Discussion points and future directions

3.1 The evidence provided by the geotechnical boreholes is useful in highlighting the key points of the route corridor and flagging up areas of uncertainty, archaeological potential and areas in which additional work is required. However, a number of key points can be noted.

3.2 Insufficient information is available to determine the archaeological and palaeoenvironmental potential for the higher areas of gravel between 94800E and 95100E. Test pit or borehole information is required from these deposits should there scheme impact in this area.

3.3 The wetland/dryland marginal zone between 95100E and 95300E may be of considerable archaeological significance with the potential for a wide range of evidence documenting human activity from the Neolithic onwards. Such evidence will only be identified through purposive trenching through these sequences if scheme impact necessitates.

3.4 For much of the route corridor a relatively consistent pattern of Holocene sediments rest on the gravel topographic template. On the basis of past experience (e.g. extensive monitoring of such situations during the Thames tunnel cut and cover construction on the CTRL) occupation of such areas is considered unlikely although chance finds cannot be ruled out. Of greater significance are the edges of the peat zones and their relationship with the adjacent minerogenic sequences. The possibility that weathered surfaces contemporary with peat development may occur within the minerogenic sequences should be noted. If present these may well have associated human activity on them. The only evidence for a topographic high (island) within this floodplain is the slight rise in the topographic template between 95000E and 95750E. Evidence for human activity on this topographic rise may be addressed through test pitting. Elsewhere the recovery of boreholes for sequence assessment should be considered through sequences containing peats and those without.

## References

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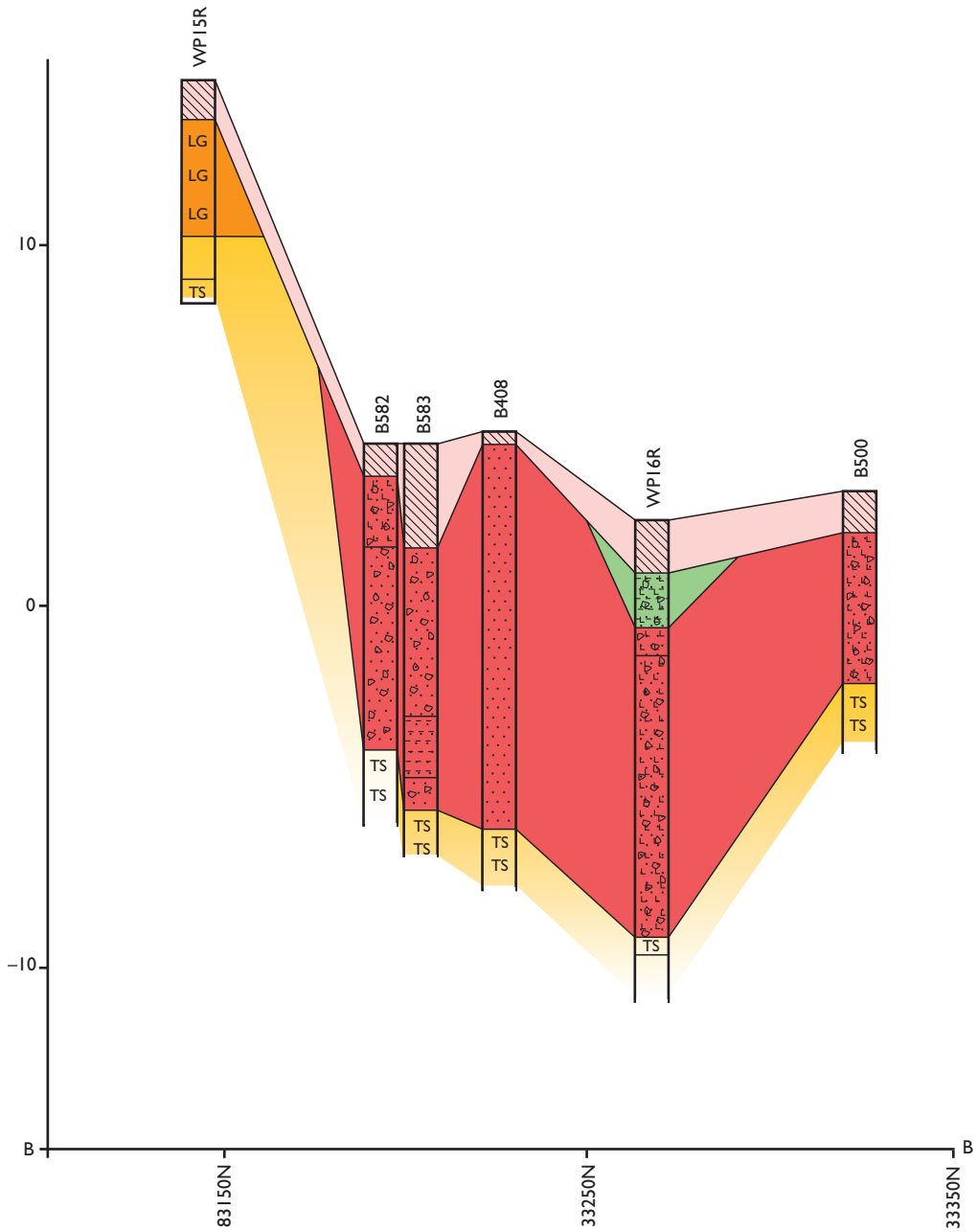
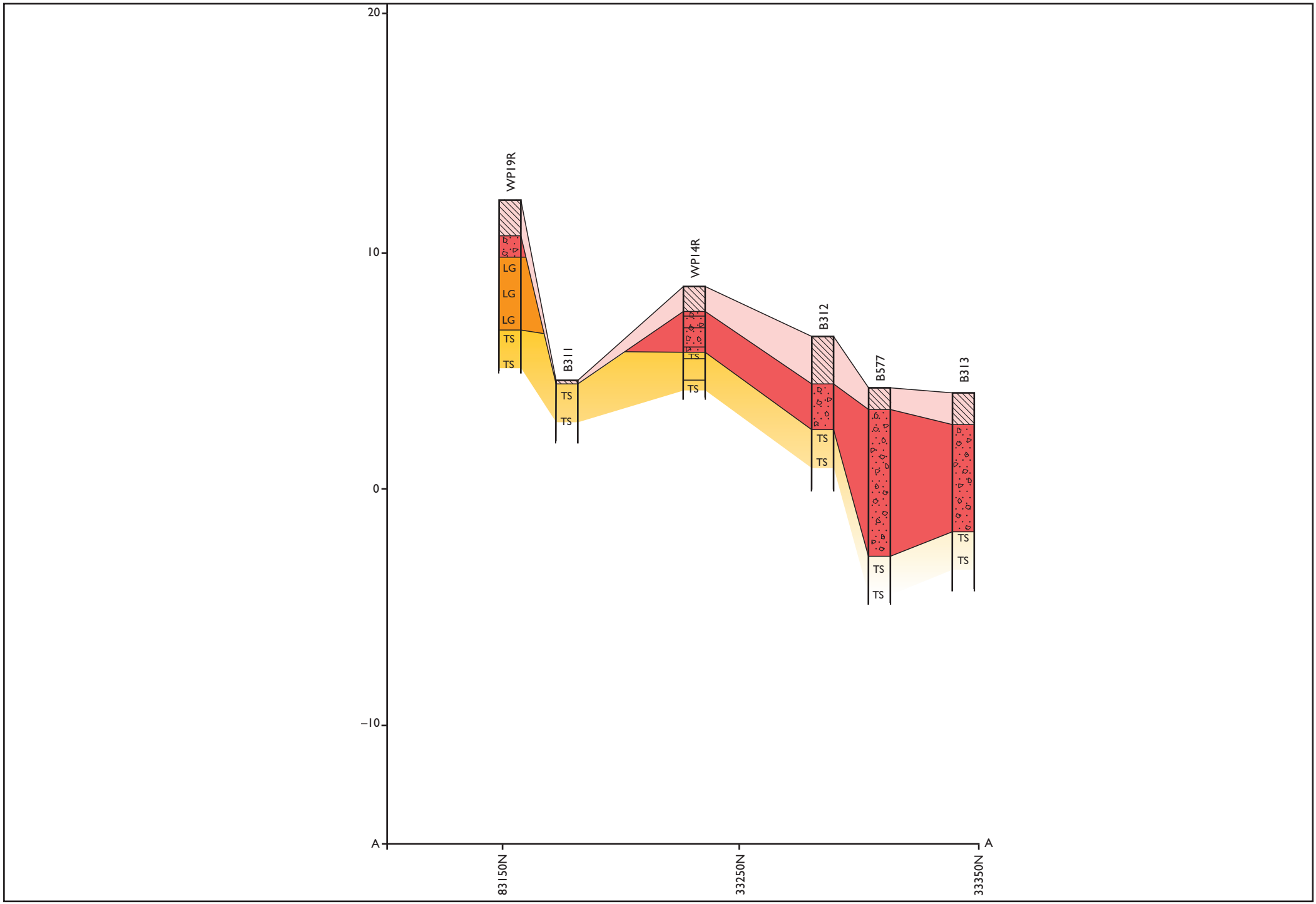
Long, A.J., Scaife, R.G. and Edwards, R.J. 2000 Stratigraphic architecture, relative sea-level, and models of estuary development in southern England: new data from Southampton Water. 253 – 279. In: Pye, K and Allen, J.R.L. (eds.) *Coastal and Estuarine Environments: sedimentology, geomorphology and geoarchaeology*. Geological Society, London Special Publication 175. The Geological Society: London.

# Appendix 3 – Deposit Model Drawings


VVP15R
B582
B583
B408
VVP16R
B500
LG
LG
LG
TS
TS
TS
TS
TS
TS
TS
TS
TS
TS
10
0
−10
B
B
83150N
33250N
33350N


20
10
0
−10
A
A
VVP19R
B311
VVP14R
B312
B577
B313
LG
LG
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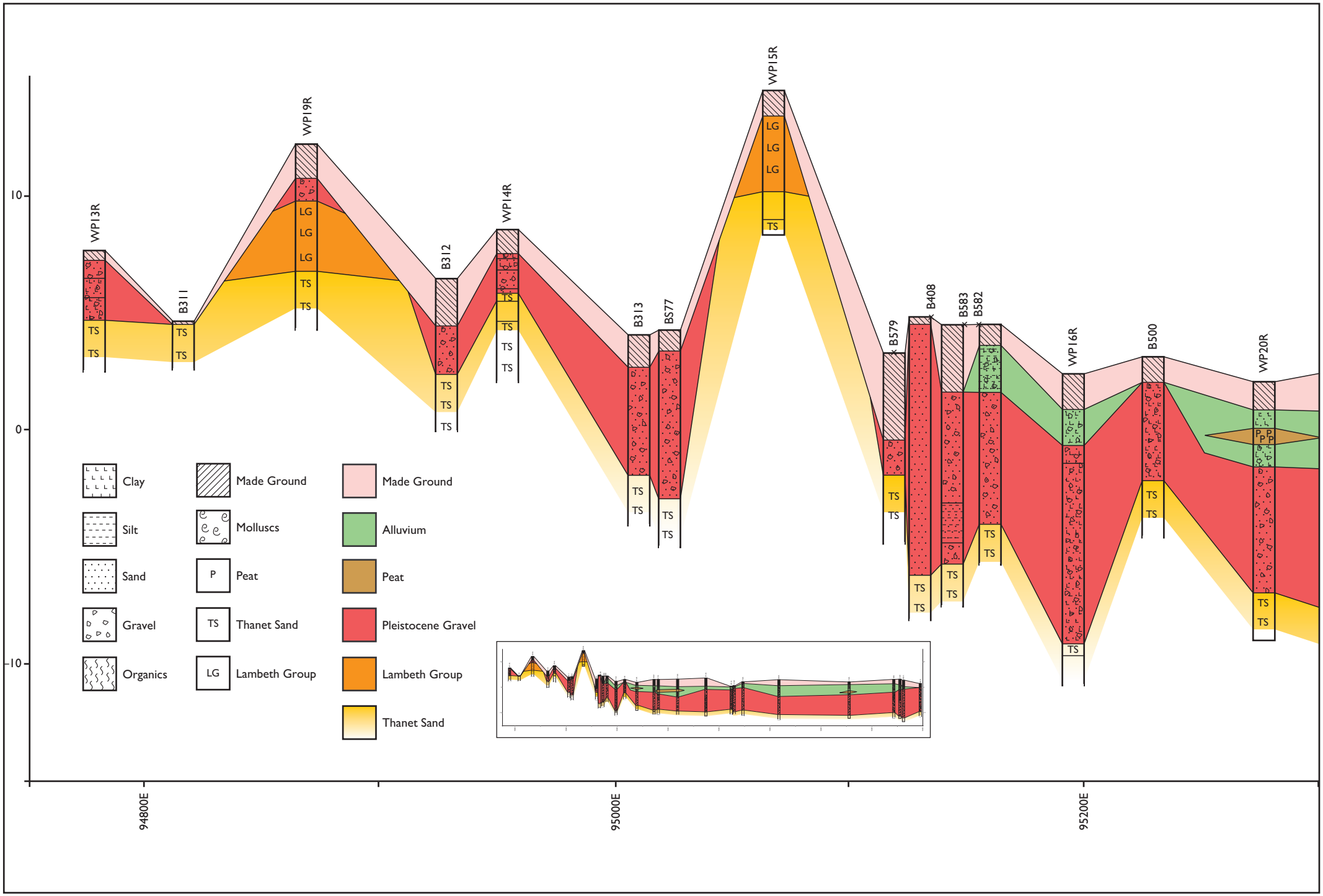
WP13R
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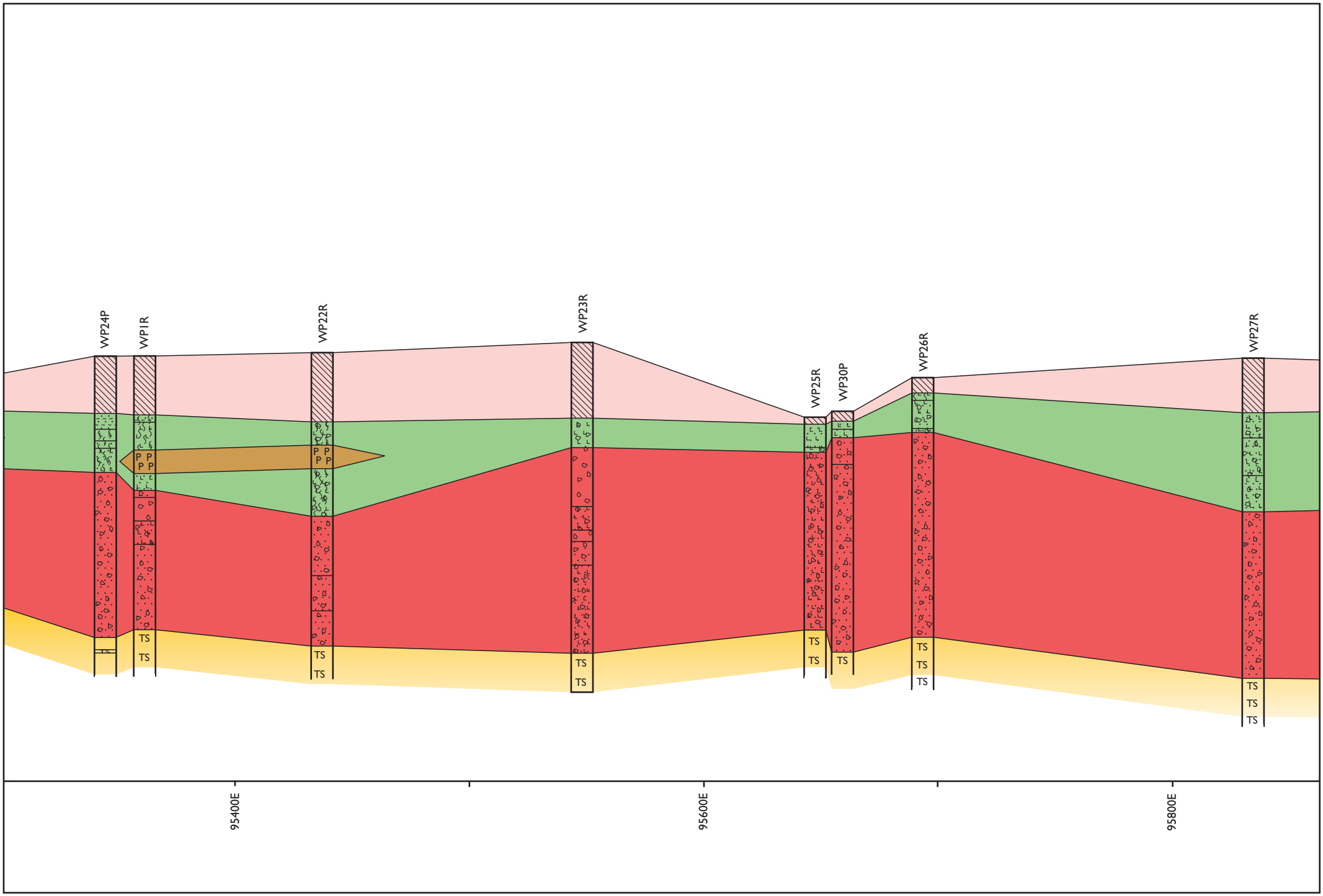
WP19R
B312
WP14R
B313
BS77
WP15R
B579
B408
B583
B582
WP16R
B500
WP20R
LG
TS
P
10
0
-10
94800E
95000E
95200E
Clay
Silt
Sand
Gravel
Organics
Made Ground
Molluscs
Peat
Thanet Sand
Lambeth Group
Made Ground
Alluvium
Peat
Pleistocene Gravel
Lambeth Group
Thanet Sand


WP24P
WP1R
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WP23R
WP25R
WP30P
WP26R
WP27R
P
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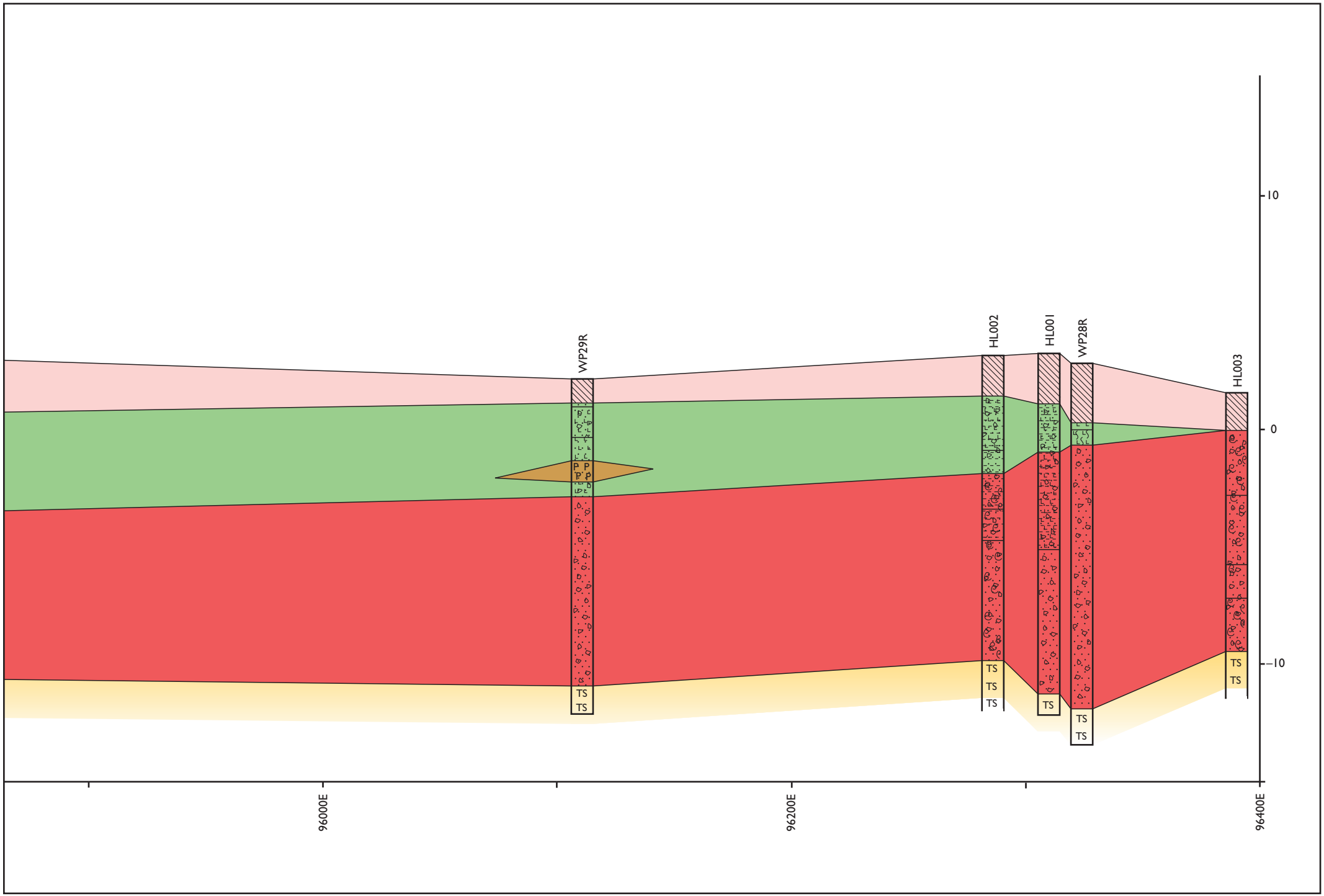
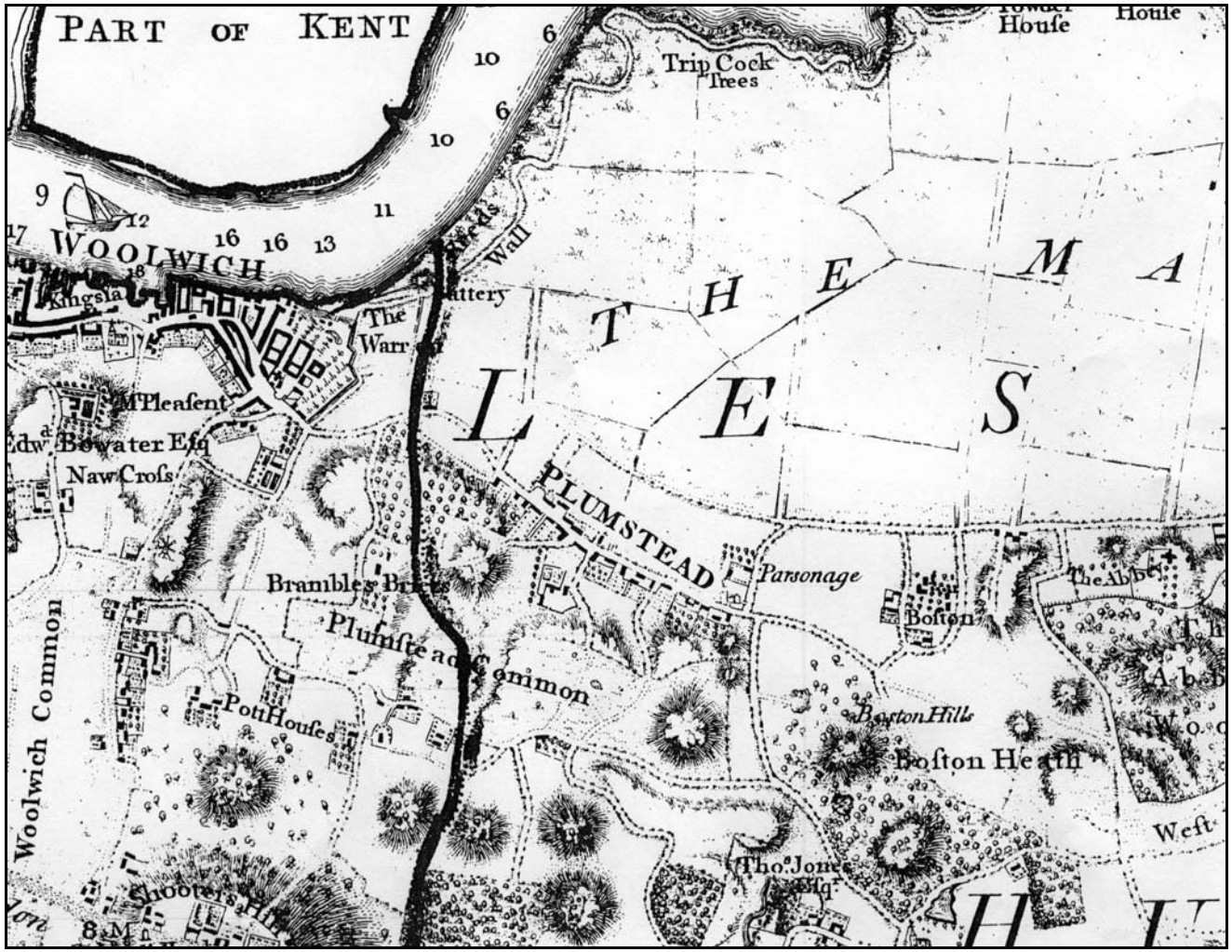
95800E


VVP29R
HL002
HL001
VVP28R
HL003
TS
TS
TS
TS
TS
TS
TS
TS
10
0
−10
96000E
96200E
96400E

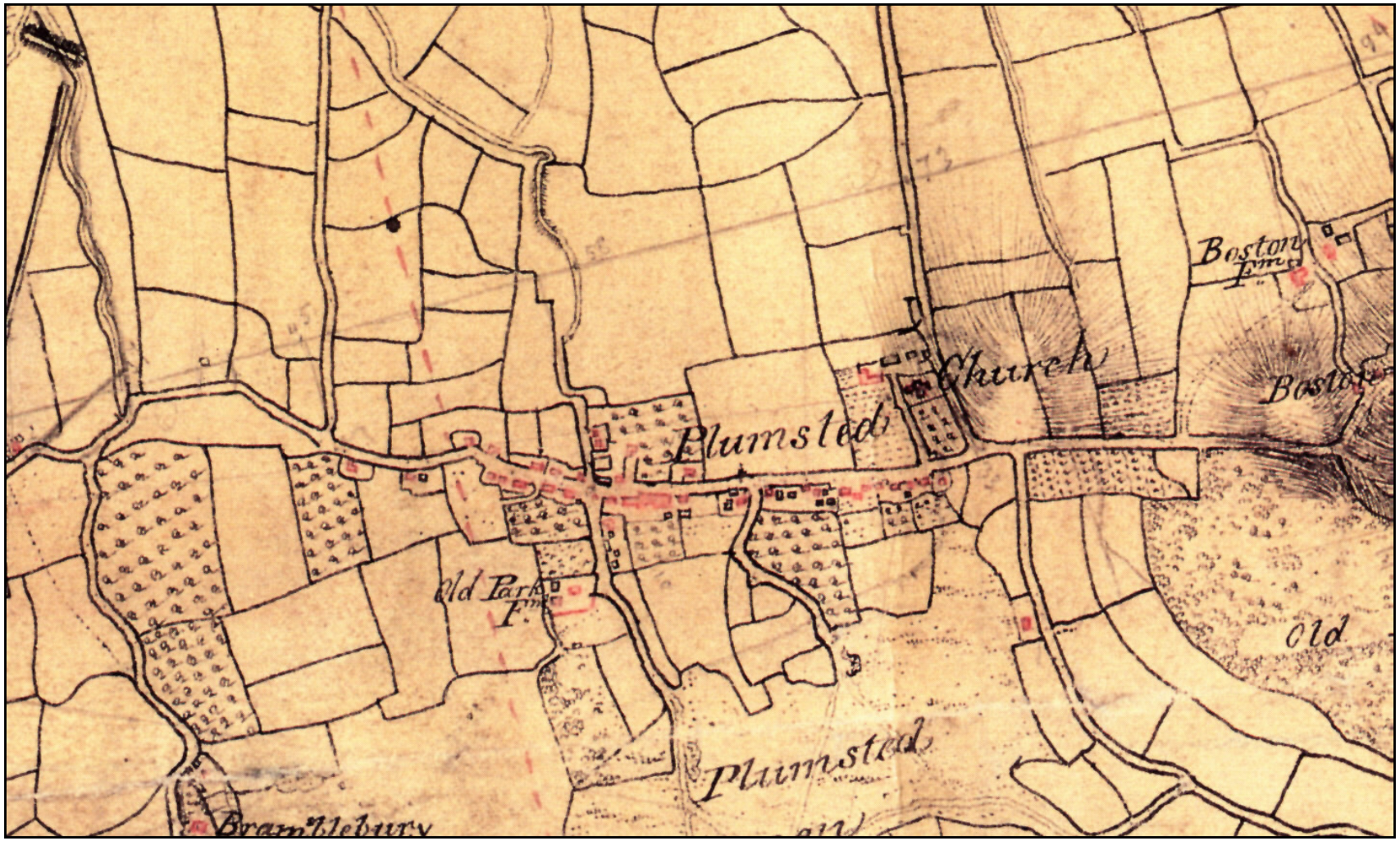
# Appendix 4 – Historic Maps

Appendix 4 – Plumstead Portal Historic Maps.



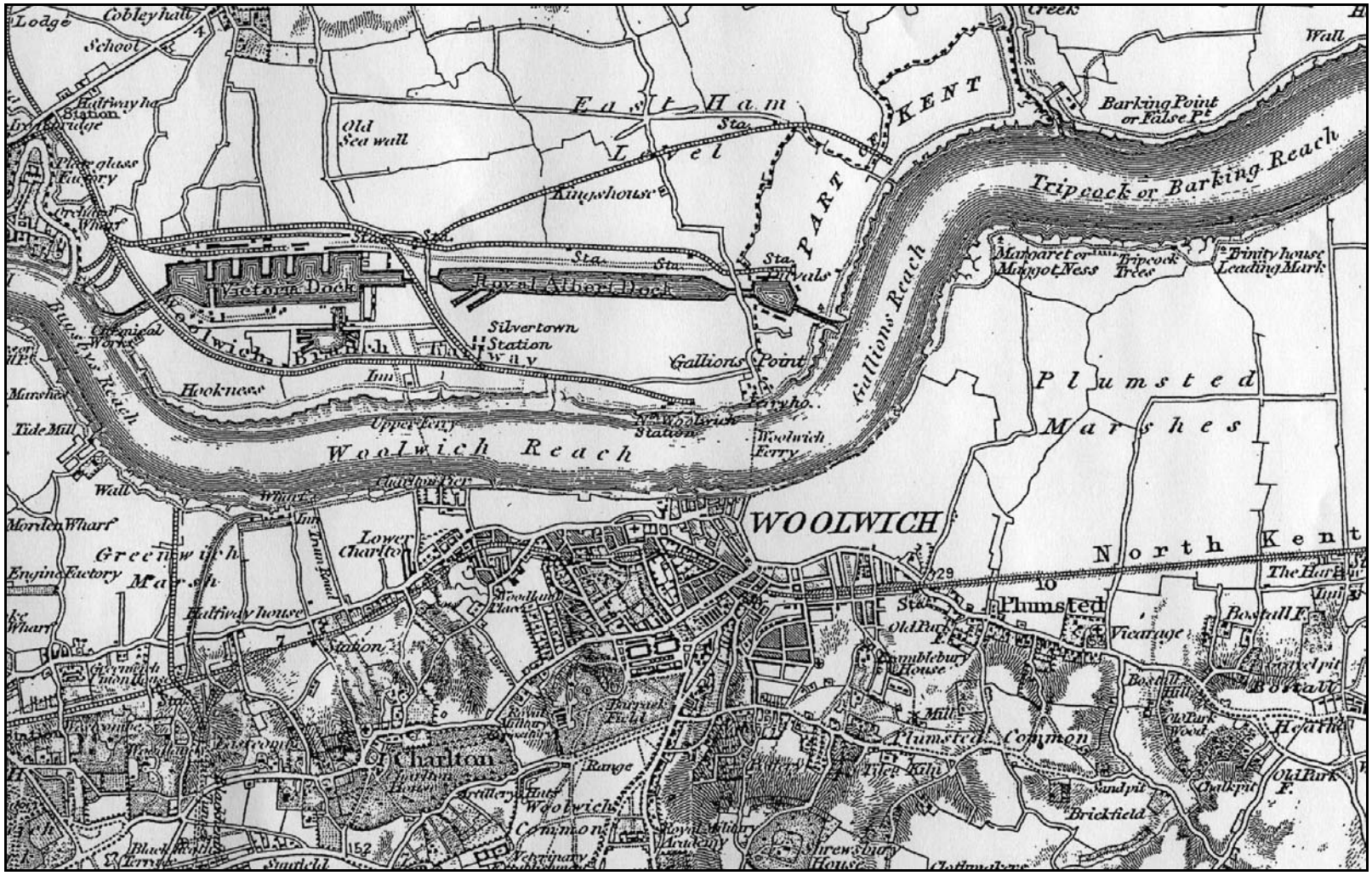

**1769 Andrews Dury Herbert Map**

Appendix 4 – Plumstead Portal Historic Maps.



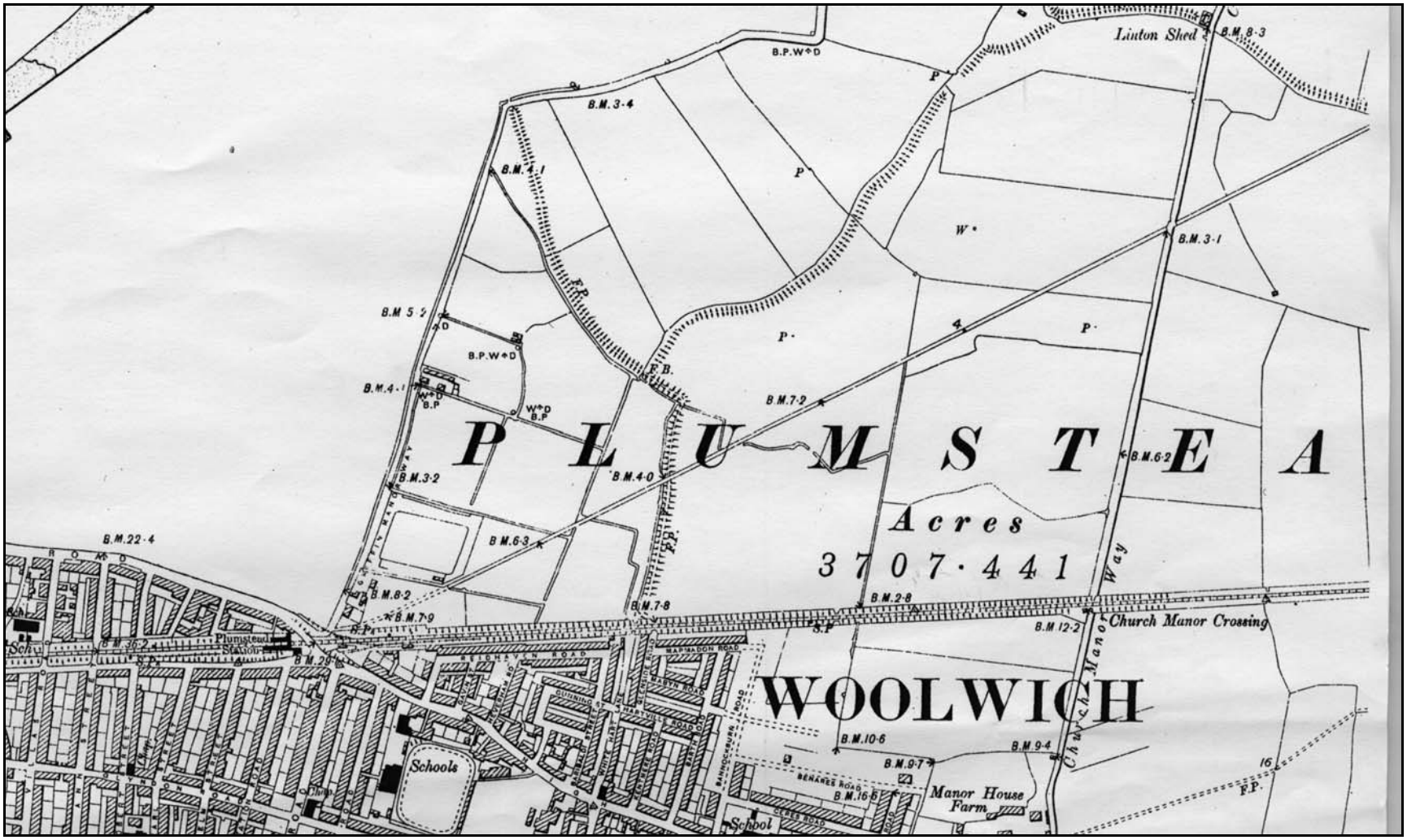

**1799 Ordnance Survey Map**

Appendix 4 – Plumstead Portal Historic Maps.




**1844 Ordnance Survey Map**

Appendix 4 – Plumstead Portal Historic Maps.




**1899 Ordnance Survey Map**

# 9 References

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