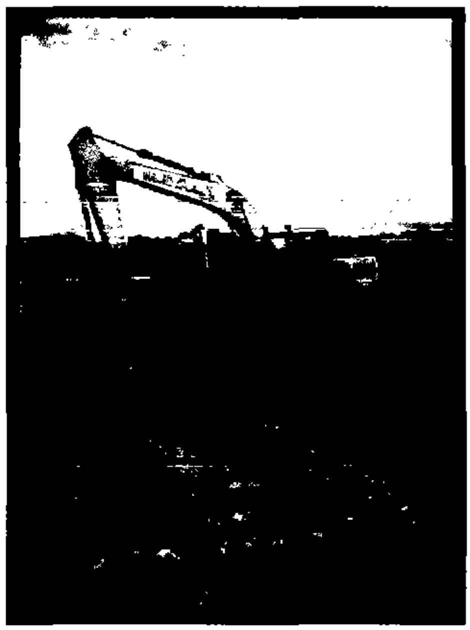
Channel Tunnel Rail Link

Ebbsfleet Sports Ground
Phase 2 Evaluation Archaeological Works
Fieldwork Report

December 2001



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Channel Tunnel Rail Link
Union Railways (North) Limited

EBBSFLEET SPORTS GROUND, NORTHFLEET, KENT

ARC ESG00

PHASE II EVALUATION ARCHAEOLOGICAL WORKS FIELDWORK REPORT FINAL

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Contract URN/342/ARC/0018

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SUMMARY

The Oxford Archaeological Unit (OAU) was commissioned by Union Railways (North) Limited (URN) to undertake an evaluation on the site of the Ebbsfleet Sports Ground Archaeological Works, on land within the Ebbsfleet Valley, south of Northfleet, near Gravesend, Kent (ARC ESG00). This work formed part of an extensive programme of archaeological investigation carried out in advance of the construction of the CTRL. The site has been divided into four topographical zones, based on the general characteristics of the sediments present: Zone 1 (North Valley Side), Zone 2 (South Valley Side), Zone 3 (Valley Bottom) and Zone 4 (Gravel Spur - Northfleet Villa).

Pleistocene/ Paleolithic

Late Middle and Late Pleistocene deposits were present, dating from Oxygen Isotope Stages (OSI) 8–2 (300,000 to 10,000 BP).

Middle Palaeolithic (Levalloisian) archaeological evidence was present in colluvial/ solifluction deposits from earlier in this range in Zone 2 (South Valley Side), probably Oxygen Isotope Stages (OIS) 8 to 6 (300,000 to 130,000BP) and possibly also OIS 5 to 4 (115,000 to 60,000 BP). The artefacts in these deposits have probably been transported a short distance by colluvial/ solifluction processes, but the assemblages are unlikely to have been distorted by differential size-sorting. There is some potential for the recovery of undisturbed horizons within these deposits. Although very few palaeoenvironmental indicators have been recovered, the proximity of the site to known fossiliferous deposits within the Bakers Hole SAM suggest that potential for such deposits remains high within the CTRL route.

Holocene: Palaeoenvironment

The waterlogged Holocene alluvial sequence filling the valley bottom is rich in paleoenvironmental indicators potentially capable of documenting changes in climate, sea-level change, vegetation and human land-use. Pollen, waterlogged plant macrofossils, insects and molluscs are all abundant and evidence for broad-scale environmental change can be detected from the trench samples assessed. When correlated and dated this data will enable detailed reconstruction of rising water levels throughout the Holocene. The assessed environmental sequences were recovered from sequences containing later prehistoric and Roman waterlogged structures, offering excellent potential for dating the sequence. Problems have been encountered in the extraction of foraminifera and ostracods for assessment and large scale analysis may not therefore be possible. Geoarchaeological modelling of the major stratigraphic units, using 376 stratigraphic logs, has been used to generate preliminary projections of the extent of the wetlands in the Neolithic, Bronze Age and Roman periods, and cross-sections correlating the major stratigraphic units.

Holocene: prehistoric

Evidence for Neolithic/ Bronze activity was generally sparse across most of the site, for the most part comprising redeposited worked flint. However, possibly in situ, concentrations of artefacts, including pottery as well as flint, are present adjacent to the Ebbsfleet in trenches 3835TT and 3836TT and an ephemeral roundwood structure in trench 3815TT has been radiocarbon dated to the middle Bronze Age (1690-1520 cal BC). The Neolithic/ Bronze Age pottery cannot at present be separated, although a single sherd of Ebbsfleet ware makes it likely that at least some of the material is mid-late Neolithic. Evidence for Iron Age activity is limited to a few sherds of potentially late Iron Age pottery found in association with the Roman building complex.

Holocene: Roman

Roman activity is concentrated at the southern end of the site in Zone 4, in the area of the extensively excavated Northfleet Villa, and in Zone 2, where a possible building has been identified. The main building complex is generally poorly preserved as a result of extensive previous archaeological investigations (in 1909-11 and 1977-84) stone-robbing and peripheral quarry activity (including construction of a tramway through the site in the early 20th century). However, pockets of surviving stratigraphy may be expected, particularly in the deeper deposit sequences on the edge of the alluvial basin. There is also high potential for recovery of waterlogged remains of unpredictable nature and extent in the floodplain, in immediate proximity to the Roman building complex, including evidence for revetment and management of channels in the wetlands, structures and dumped debris associated with the Roman occupation area.

Holocene: Anglo-Saxon

Two sherds of Anglo-Saxon pottery were found unstratified in the vicinity of the Roman Villa complex, adding to slight evidence from previous excavations for Anglo-Saxon activity on the site.

SECTION 1 : FACTUAL STATEMENT

1. BACKGROUND

1.1 Introduction

1.1.1 The Oxford Archaeological Unit (OAU) was commissioned by Union Railways (North) Limited (URN) to undertake an evaluation on the site of the Ebbsfleet Sports Ground Archaeological Works, on land within the Ebbsfleet Valley, south of Northfleet, near Gravesend, Kent (ARC ESG00). This work formed part of an extensive programme of archaeological investigation carried out in advance of the construction of the CTRL.

1.1.2 Construction work in the Ebbsfleet Valley will include the CTRL itself, a connecting line to the existing North Kent Line (NKL), the Ebbsfleet Intermediate Railway Station, and station access roads.

1.1.3 The location of the site is shown on Figure 1. The fieldwork event details are listed in Table 1.

Table 1: Fieldwork event details

Fieldwork Event Name	Type	Fieldwork Event Code	Contractor	Dates of Fieldwork
Ebbsfleet Valley Sports Ground	Evaluation	ARC ESG 00	OAU	19/03/01 - 28/05/01

1.1.4 The archaeological evaluation was conducted between 19 March and 28 May 2001. A Written Scheme of Investigation (WSI) was prepared by Rail Link Engineering (RLE) and agreed in consultation with Kent County Council and English Heritage.

1.2 Location

1.2.1 The site is located on the south side of the Ebbsfleet Valley, c. 600m south of the River Thames, and is bounded by the River Ebbsfleet to the North and land-filled former quarries to the south. The central point of the site is URN Grid 41418 54195 NGR 561413 174196 (Figure 2).

1.3 Geology, topography and land-use

Pleistocene Geological Sequence

1.3.1 The Ebbsfleet is a small stream, which rises at Springhead and flows north to join the Thames at Northfleet. The Thames flows west-east at this point, parallel with the late Cretaceous northern dipslope of the Wealden anticline. Pleistocene deposits, known as the Boyn Hill gravels or more properly the Orsett Heath gravel unit, line the higher ground above its southern bank, cut into the Late Cretaceous/Early Tertiary bedrock at a height of c. 25m OD.

1.3.2 The Ebbsfleet Valley cuts transversely through these deposits and into the underlying Chalk bedrock, and is filled with a complex sequence of Pleistocene deposits which thus post-date the Orsett Heath gravel unit. The Pleistocene deposits

fall into two main categories: water-lain deposits (fluvial silts); and colluvial and solifluction deposits. The Holocene valley of the Ebbsfleet is filled with a complex sequence of alluvial, colluvial, fluvial and possibly estuarine deposits.

1.3.3 The fluvial silts reflect warmer periods when the Thames flowed at a higher level than it now does. This type of deposit is noted for its environmental evidence and the potential for *in situ* artefactual material.

1.3.4 Colluvial and solifluction deposits reflect colder periods when the banks were exposed and the surrounding land surface was de-stabilised so as to accumulate in the valley bottom. These deposits can contain disturbed environmental and artefactual material transported from their original positions, or can bury *in situ* material with little disturbance to them.

1.3.5 Several warm-cold cycles have occurred since the formation of the Ebbsfleet valley and this has resulted in a complex sequence of fluvial, solifluction and colluvial deposits. Reconstruction of this sequence is further complicated by the scale of quarrying which has occurred in the valley and which has destroyed the majority of the deposits.

Holocene Geological Sequence

1.3.6 The Holocene valley of the Ebbsfleet is filled with a complex sequence of alluvial, colluvial, fluvial and possibly estuarine deposits. Fieldwork carried out during geotechnical investigations for Kent County Council (Barham & Bates 1995) has shown that, in the northern part of the evaluation area (ie. downstream of the Northfleet villa site), the sequence is characterised by more than 7 m of fine-grained sediments overlying gravel. It is suggested that these deposits may fill a lake area or a tidally-influenced estuary. A period of lowered water levels, resulting in the formation of a land surface, is indicated by peat formation within the sequence. Upstream of the villa site, extensive peat formation indicates a wetland environment, marginal to the deeper water to the north. The peat deposits are, in places, overlain by silty clays suggesting a period of higher water levels.

Modern Landuse

1.3.7 Much of the valley has been quarried for chalk in recent years and many of the extraction areas have been landfilled with potentially contaminated material. To the south and southeast of the sports ground, the Northfleet villa site lies within an area of scrub with limited clearings, and in an open area of mown grass. To the east of the Ebbsfleet, much of the area is made up of rough grass with marshy areas close to the stream. To the south, extends a narrow strip of thick scrub, with larger trees lining the edge of the reed beds adjacent to the river.

1.4 Archaeological and historical background

Pleistocene/ Palaeolithic

1.4.1 The Ebbsfleet Valley is of national importance for Palaeolithic archaeology and Pleistocene geology and is the location of the Baker's Hole Levalloisian sites discovered by Smith (1911), Burchell (1933; 1935) and Sieveking (1971).

1.4.2 Previous archaeological discoveries in the Ebbsfleet valley range in date from the Palaeolithic to the Saxon period and are summarised in the Channel Tunnel Rail Link Assessment of Historic and Cultural Effects Specialist Report prepared by

URL as part of the Environmental Assessment of the CTRL (URL 1994, Volume 4 Appendix B). The major findings are outlined below:

1.4.3 The area of the evaluation includes surviving Pleistocene deposits, of which two areas form a Scheduled Ancient Monument for Palaeolithic remains (Kent No 267a and b). A number of investigations of these deposits have taken place this century: R A Smith carried out excavations at the nationally important site known as Baker's Hole in 1908-1909 (Smith 1911); J P T Burchell worked in the area in the 1930s (eg Burchell 1933); and Kerney and Sieveking in the 1960s and 1970s (Sieveking 1970, 1971, 1972, and Kerney and Sieveking 1977). More recently, F Wenban-Smith (1993) has carried out research into the Palaeolithic remains within the valley.

1.4.4 In 2000 a programme of investigation was carried out within the limits of Scheduled Ancient Monument Kent 267a, in advance of the relocation of Pylon ZR4 in connection with the CTRL construction (figure 2). The excavations confirmed the presence of significant Palaeolithic archaeological horizons, namely a deep sequence of Pleistocene deposits containing a range of biological evidence including large mammals, small mammals, amphibians, fish, birds, molluscs and ostracods. Artefactual evidence was, however, absent.

Holocene: Later Prehistoric

1.4.5 In the 1930s, Burchell excavated two sites (TQ 61747362 and TQ 61577307) immediately adjacent to the river Ebbsfleet on the valley floor, which produced both Mesolithic and Neolithic material in stratified deposits (Burchell 1938). One of these sites produced a particularly fine group of middle Neolithic decorated pottery, termed Ebbsfleet ware (Burchell and Piggott 1939). The site was re-excavated in 1960 by Sieveking, when horizontal waterlogged timbers were found immediately above a deposit containing Ebbsfleet ware (Sieveking 1960). Radiocarbon dating of the timbers produced a date of 3500-3050 cal BC. The two sites are a Scheduled Ancient Monument (Kent No 268).

1.4.6 A two-stage evaluation within the Ebbsfleet Sports Ground site was carried out by the OAU in 1997, on behalf of Blue Circle Industries plc (OAU 1997), comprising eleven boreholes and three test pits. The evidence indicated that late Pleistocene chalk solifluction sediments and river gravels form a wedge of sediment thinning and sloping from west to east within the study area. These deposits are overlain by soft, unconsolidated Holocene sediments that thin to the west and south. The main Holocene sediments consist of made ground, upper clay-silt, an organic complex (including an upper reed peat and a lower wood peat) and a lower clay-silt. Archaeological material including burnt and struck flint was recovered from one of the test pits within or below the wood peat and in two boreholes from within the lower clay-silt.

1.4.7 A programme of archaeological/ geological work, carried out in 2000-2001, in advance of construction of the 1.5km long South Thameside Development Route 4 (STDR4), investigated the Holocene alluvial sequence on the eastern side of the Valley, directly opposite the CTRL works on the western side. The investigations, carried out by the Oxford Archaeological Unit on behalf of Kent County Council, comprise a two-stage evaluation (borehole survey and trial trenches), followed up by a programme of mitigation in Summer 2001 (ongoing at the time of writing). The sequences encountered indicate that the range of stratigraphic units identified in previous investigations continue within the STDR4 study area. However, more complex stratigraphy was recorded within the sedimentary units than has previously been seen during CTRL works on the western side of the valley. This was

particularly highlighted by the occurrence of tufa deposits within the main reed and wood peat sequence. The solifluction deposits also contained complex stratigraphy containing evidence for a late glacial sediment horizon previously unidentified within the Ebbsfleet Valley.

1.4.8 The environmental samples recovered during the STDR4 evaluation demonstrate that preservation of organic material is variable throughout the sedimentary sequences. Low levels of pollen preservation were present in the samples below the level of the main peat bed. Similarly the insect, mollusc and plant remains were very limited from the lowest deposits. More detailed evidence was gained from the better preservation within the peat levels and overlying Clay-Silts. These provide good evidence for the valley palaeoenvironments and human influence on the landscape. Again diatom preservation was absent from the lower deposits but was abundant within the Upper Clay-Silt unit and, combined with the sediment sequence and pollen evidence, enables a tentative interpretation of the prevailing habitats and water levels/conditions along the valley.

1.4.9 Artefactual material was recovered from five of the STDR4 evaluation trenches within the clay-silt and peat sequence of the Ebbsfleet Valley. This material derived entirely from within or upon the surface of deposits and was not contained in definable features. Most notable of the assemblages was the occurrence of Ebbsfleet ware upon the surface of a peat deposit in association with burnt flint and worked flint, probably representing the use of an *in situ* Neolithic land surface. Probable Neolithic and Bronze Age flintwork was also recovered from similar horizons within STDR4 Trench 8, where it was associated with worked wooden stakes. Situated within 250-400m of the Ebbsfleet ware type-site (Kent SAM 268), first excavated in the 1930's, these trenches suggest that extensive evidence of human activity is present at depth within the Ebbsfleet Valley sedimentary sequence. The mitigation trenches excavated to date at the Northern end of the STDR4 route have encountered further archaeological evidence in the form of late Bronze Age to Iron Age timber structures and gravel surfaces associated with activity on the edge of the floodplain.

Holocene: Roman

1.4.10 Northfleet Roman Villa was first excavated during 1909-1911 by W H Steadman (Steadman 1913) after Roman remains were exposed in the side of a quarry tramway cutting. Two wells, a lime kiln, and the remains of a substantial building or buildings were located. A second building was discovered 20 yards to the south of the main buildings, partially destroyed by quarrying. Although unable to excavate much of the building, Steadman states that it had been 'thoroughly ransacked for building material' (Steadman 1913, 14). The site was re-excavated from 1977-1984 by a local archaeological society, the Thameside Archaeological Group (TAG), who excavated a bath house immediately to the north of the main building complex. Several short reports of their work have appeared in the Kent Archaeological Review between 1978 and 1984.

1.4.11 The CTRL Phase 1 evaluation re-examined some of the TAG trenches in order to evaluate the condition of the remains and assess the survival of Roman stratigraphy. The wall-footings of some of the Roman buildings were recorded in trenches left open following the previous archaeological investigations and it was possible to match the surviving remains to a plan of the walls made during the original excavation of the site by Steadman in 1911 (figure 15). No floor surfaces survived in the limited areas examined although the previous excavators had reported concrete floors and painted plaster surviving *in situ*. In addition, pits and ditches of

Roman date were excavated in the vicinity of the buildings. Although only a small quantity of pottery was recovered, it indicated that there may have been a late Iron Age phase of occupation and that occupation continued throughout the Roman period. Well-preserved environmental remains were retrieved from a number of the features and waterlogged organic deposits of Roman date were recorded at depth within the alluvial deposits close to the Ebbsfleet river. Saxon pottery was recovered from colluvial deposits close to the villa raising the possibility of a Saxon phase of occupation.

1.4.12 Further Roman remains as well as Saxon deposits were recorded in the face of the quarry pit now known as Blue Lake. Their exact location is unknown, but was recorded as being on 'the right side of the entrance into the main chalk quarry located to the north-east of the Northfleet sewage works' (Burchell & Brailsford 1948).

1.5 Report structure

1.5.1 This report is divided into two broad sections, as follows:

- ξ Factual Statement - comprising background information, methodology, trench descriptions and quantification of artefactual and palaeoenvironmental assemblages, divided in accordance with the provisional phasing. This data is supported by the trench location plan (figure 2), selected trench logs, plans and sections (figures 4-14), trench summary tables (Appendix 14) and specialist reports (Appendices 1-11). The results of the sub-surface topographical modelling is also included in this section, supported by figures 20-28.

- ξ Statement of Importance - comprising brief conclusions based on the recorded data, considering each of the Landscape Zone Priorities and Fieldwork Event Aims and a statement of the potential of the data to address local, regional, national and international research themes. This section is supported by interpretative site plans indicating the possible date, extent and condition of archaeological remains within the site boundary (figures 16-19).

1.5.2 For the purpose of description, the site has been divided into four topographical zones, based on the general characteristics of the sediments present, albeit with a certain degree of overlap (figure 2).

Table 2: Summary of site zones

Zone	Description	Predominant sediments	Trial Trenches
1	Valley side (north)	Pleistocene (fluvial, solifluction and colluvial), overlain by Holocene (colluvial, and fringe of Holocene alluvium)	3782TT, 3783TT, 3784TT, 3785TT, 3787TT, 3789TT, 3790TT, 3791TT, 3801TT, 3804TT
2	Valley side (south)	Pleistocene (fluvial, solifluction and colluvial)	3798TT, 3802TT, 3803TT, 3805TT, 3806TT, 3807TT, 3808TT, 3829ATT, 3829BTT
3	Valley bottom	Late/final Pleistocene (fluvial/colluvial) overlain by Holocene (alluvium, and maybe colluvium towards fringe).	3793TT, 3794TT, 3795TT, 3796TT, 3797TT, 3799TT, 3800TT, 3809TT, 3810TT, 3811TT, 3812TT, 3813TT, 3814TT, 3815TT, 3816TT, 3817TT, 3818TT, 3819TT, 3828TT, 3837TT
4	Gravel spur	late/final Pleistocene (fluvial/colluvial) overlain by Holocene (colluvium). Northfleet Roman Villa	3820TT, 3830TT, 3833TT, 3834TT, 3835TT, 3836TT, 3831TT, 3832TT

1.5.3 The preliminary phasing divides the sequence in each trench into Pleistocene and Holocene deposits. The Holocene sequence is further sub-divided into prehistoric, Roman and post-Roman periods.

2. AIMS

2.1 CTRL archaeological research strategy

2.1.1 The fieldwork aims were defined within the framework of the CTRL Archaeological Research Strategy (ARS), supplemented by a Research Strategy for Palaeolithic Archaeology and Pleistocene Geology (RSPAPG).

2.2 Landscape zone priorities

2.2.1 The Ebbsfleet Valley falls within the Greater Thames Estuary Landscape Zone, as defined by the ARS, and was identified as a key area for addressing research objectives in the 'Hunter-forager', 'Early agriculturalist' and 'Towns and their rural landscapes' period categories.

2.2.2 The fieldwork priorities were as follows:

a - Reconstruction of the changing environment of this part of the Greater Thames estuary, in terms of its geomorphology, vegetation and climate, through the implementation of a sampling strategy.

b - Characterisation of the nature of human exploitation of the Ebbsfleet floodplain, and its margins (including the terraces and the intertidal zone), and how this changes through time.

c - Determination of the effect of human activity upon the environment of the floodplain and its margins. Does this effect change in nature and intensity with time?

d - Consideration of the effects of riverside exploitation and trading locations.

2.3 Primary fieldwork event aims

2.3.1 The fieldwork event priorities were set out in the Written Scheme of Investigation, which was prepared by Rail Link Engineering (RLE) and agreed in consultation with Kent County Council on behalf of the local authority. The primary aims were to determine:

- ξ the presence/absence, extent, condition, character, quality and date of any archaeological remains within the area of the evaluation;
- ξ the presence and potential of environmental and economic indicators preserved in any archaeological features or deposits;
- ξ the local, regional, national and international importance of such remains, and the potential for further archaeological fieldwork to fulfil local, regional, national and international research objectives.

2.3.2 The specific objectives were as follows:

General

- ξ Aim 1 - Evaluate the depth and extent of made ground within the investigation area.

- Aim 2 - Evaluate the depth and extent of Holocene deposits within the investigation area.
- Aim 3 - Evaluate the depth and extent of any surviving Pleistocene deposits within the investigation area.
- Aim 4 - Establish the surviving topography of chalk bedrock within the investigation area.
- Aim 5 - Provide a detailed graphical representation of the subsurface topography of the investigation area as derived from Aims 1-4 above.
- Aim 6 - Relate the findings of the evaluation to the results of previous archaeological work in the valley, including that commissioned by URL.

Holocene Valley sedimentation

- Aim 7 - Assess the palaeoenvironmental significance and archaeological potential of any colluvial, alluvial (marine/ peat horizons), marsh and channel margin Holocene deposits that may be preserved on the site.
- Aim 8 - Correlate the Holocene sequence revealed with the results of previous investigations in the Ebbsfleet Valley in particular OAU 1997 (EBBS 97) and URL 1997 (ARC EFT97).

Pleistocene

- Aim 9 - Assess the palaeo-environmental potential and archaeological potential of any Pleistocene age deposits that may be preserved on the site.
- Aim 10 - Recover detailed palaeo-environmental data from samples where appropriate.
- Aim 11 - Provide data to correlate any Pleistocene stratigraphy revealed with the results of previous CTRL investigations in the Ebbsfleet Valley, in particular Areas 8, 3 and 6 (URL 1997 ARC EFT97) and previous works within the Bakers Hole SAM (ARC ZR400).
- Aim 12 - Provide data to update our understanding of the sub-surface topology and temporal and spatial distribution of sequences within the valley.
- Aim 13 - Assess the potential of the data to contribute to objectives outlined in the ARS and RSPAPG, particularly to provide an up-dated geological model of the geometry of Pleistocene sedimentological facies and major depositional units, and to place them in a secure litho-, chrono- and bio-stratigraphic framework.

Later prehistoric

- Aim 14 - Assess the extent, nature and date of any prehistoric occupation and landuse within the evaluation area particularly that relating to the Neolithic period.

Roman and medieval

- Aim 15 - Define the condition and extent of Roman activity associated with the Northfleet Villa site within the NKL connection embankment footprint.

- Aim 16 - Establish the nature and extent of surviving archaeological deposits within the excavation areas previously opened by the Thameside Archaeological Group.
- Aim 17 - Evaluate by means of limited trial pitting the depth and complexity of earlier strata sealed by the Roman levels.
- Aim 18 - Establish the presence/ absence of any structural remains associated with a possible location for a bath-house inferred by the previous evaluation.
- Aim 19 - Establish the presence/ absence of any post-Roman occupation and land-use within the excavation area.

3. METHOD

3.1 Geoarchaeological modelling

3.1.1 A database of geotechnical and geoarchaeological information from the Ebbsfleet area has been constructed for the purpose of modelling the topography of major stratigraphic units within the valley. The database contains lithological information from a number of projects and historical borehole/geotechnical data, principally CTRL, STDR4 and the BCI Northfleet Rise archaeological evaluation.

3.1.2 One of the key constraints in constructing and utilising a database from areas of complex stratigraphy such as the Ebbsfleet area is the difficulty in entering and storing data where links between data points are unknown prior to data entry. This problem limits the software systems that are suitable for complex data storage (Bates in prep.). Consequently systems commonly in use in archaeological organisations, e.g. Rockworks 98 or Spatial Explorer, are unsuitable due to the necessity to define stratigraphy or surfaces prior to data entry.

3.1.3 In this study TerraStation II was selected for database construction. This system allows data to be stored as depth related lithological units only necessitating the input of x/y/z co-ordinates and coded lithological information. Unique colour/code combinations have been selected to represent different lithological units, e.g. 43/8 represents Made Ground while 2/28 represents flint gravel.

3.1.4 The database has been used to generate a series of preliminary correlations between the major stratigraphic units, presented graphically as a series of cross-sections (figures 20-24) and topographic projections (25-28).

3.2 Survey

3.2.1 The trench locations were surveyed by P.H.Matts, Building and Civil Engineering Land Survey (Reading). All setting out was carried out accordance with the WSI, in relation to permanent ground markers using the URN project grid. All co-ordinates used in this report also relate to the URN grid unless otherwise stated. The trenches have been plotted (figure 2) onto digital mapping provided by RLE and based on the Ordnance Survey, using the AutoCAD graphics programme.

3.3 Excavation

3.3.1 45 trial trenches were dug, out of 48 originally specified. This includes 30 excavated as specified, 11 as specified but realigned or relocated for various reasons, and two additional test pits numbered 3829TTA and 3829TTB. Also included are re-

excavated TAG villa trenches, comprising the 'bathhouse' trench (3831TT) and a group of 3 small trenches (3832TT) (figure 2).

3.3.2 Two trenches (3802TT and 3803TT) reduced to machine-dug test pits to establish the depth of made ground in Zone 2 are excluded from the total. Three trenches were not subsequently excavated following a revision of construction impacts; a further two were relocated from Zone 2 to Zone 1, after trial pits at the western edge of Zone 2 indicated that made ground was present to depths exceeding 5m.

3.3.3 Following an instruction from RLE, OAU conducted a topsoil strip and survey in the area of Northfleet Villa in order to define the condition and extent of Roman activity associated with the Northfleet Villa site within and immediately to the south of the NKL connection embankment footprint. The work was specifically intended to clarify the extents of previous excavation areas, including Steadman's 1909-11 trenches and the 1977-84 TAG trenches. The results of the topsoil strip and survey are shown on Figure 24.

3.3.4 In other respects the investigation was conducted in accordance with the WSI and project Method Statement. All trenches were excavated by 22 tonne 360 degree excavators using 1.2m toothless ditching buckets, under close archaeological supervision. Safe manual access was achieved to depths up to 4m by stepping the trench sides. A trench box was used on occasions where ground conditions were unstable. Pleistocene deposits were further investigated up to a maximum depth of 7m by examination of samples recovered from the machine bucket.

3.4 Recording

3.4.1 Recording was carried out in accordance with the OAU Fieldwork Manual (Wilkinson ed. 1992), except where modified by the Method Statement (OAU 2000). All site records were prefaced by the site code ARC ESG00. To facilitate integration of the evaluation data in the sub-surface modelling programme, the geoarchaeological sequence in each trench was recorded using both conventional context sheets and stratigraphic log sheets, the latter completed or checked in the field by a qualified geoarchaeologist.

3.4.2 All trenches and archaeological features were photographed using colour slide and black and white print film.

3.4.3 Individual trenches were planned manually in the field at scales of 1:50 or 1:100. Sections were drawn at 1:20.

3.5 On-site sieving for artefacts and faunal remains

3.5.1 A series of deep pits were excavated into Pleistocene deposits to recover a range of evidence including artefacts and coarse faunal and floral material. Machine excavation was carried out in spits no more than 0.2m thick, soil from each spit being stored separately and labelled with the context number. 100 litre samples were shaken through 10mm and 4mm sieves to recover coarse faunal and floral remains from Pleistocene deposits with potential for recovery of such remains.

3.6 Palaeoenvironmental sampling

3.6.1 A total of 202 soil samples were taken during the evaluation for a variety of palaeoenvironmental analyses, most of which will be retained for possible future analysis (see Table 3 below). Three key Holocene alluvial sequences (3809TT, 3815TT, 3818TT) have been selected for detailed geoarchaeological assessment and

for assessment of waterlogged plant remains and insects. Two of those sequences have also been assessed for pollen and the presence/ absence of diatoms (3815TT, 3818TT). The selection was made to obtain sequences representative of open channel and marsh deposits and because of the association with *in situ* archaeological material. Due to a lack of artefactual dating evidence for the later prehistoric activity, three radiocarbon samples have been obtained from the peat and an associated wattle structure in trench 3815TT. Forty-nine samples from Pleistocene deposits have been sieved for assessment of faunal and artefactual remains and a further twenty-six samples have been processed by flotation for waterlogged plant and insect remains.

Table 3: Holocene samples assessed for pollen, ostracods and foraminifera

3815 TT	M203-1 (through floodplain fines above brushwood structure)
0-11	Reddish-brown clay-silt.
11-24	Grey clay-silt.
30-37	Organic clay-silt.
37-70	Grey clay-silt.
3815 TT	M203-2 (through floodplain fines above brushwood structure)
0-62	Very dark grey organic rich silt. Becoming more organic with depth.
62-75	Black woody peat with dense, compact and dry appearance.
3818 TT	M126 (adjacent to Roman revetment structure)
0-20	Grey clay-silt with reddish-brown staining.
20-60	Grey-brown clay-silt with black mottles.
60-70	Reddish-brown clay-silt.
3818 TT	M174 (through landsurface behind Roman structure)
0-28	Grey-brown sandy-silt.
28-42	Reddish-brown sandy-silt.
42-57	Grey/black organic clay-silt.
57-78	Grey-brown clay-silt.
78-103	Reddish-brown clay-silt.
103-base	Grey-brown clay-silt with reddish mottles.
3818 TT	M175 (floodplain fines - ?Roman channel)
0-17	Empty.
17-30	Chalk rich made ground sediment.
30-base	Grey clay-silt.

Table 4: Summary quantification of samples collected

Number of samples	**Sample collected for**
72	Bones/ Artefacts
5	Charred plant remains
1	Cremation
3	Dating (dendrochronology)
15	Palynology
1	Pedology
10	Soil micromorphology
1	Wood species ID
94	Waterlogged plant remains

4. RESULTS

4.1 Presentation of results

4.1.1 The stratigraphic data is described below by trench, organised by topographical zone. An integrated overview of the results from each zone can be found in Section 5 - Conclusions. See Appendix 14 (Trench Summary Sheets) for individual deposit descriptions and depth information. Depths are generally referred to as from ground surface, unless given as O.D. Trench logs, plans and sections have been selected to illustrate the sequence in each zone and the character of the archaeological deposits (figures 3-14).

4.2 The stratigraphic record

Zone 1 - North Valley Side

4.2.1 Trench 3782TT: (figure 3) The sequence consists of topsoil (0.00-0.25m) and deposits of Holocene colluvium (0.25-0.80m) overlying a sequence of sand, silty sand and flint gravels, interpreted as Pleistocene colluvium and solifluction (0.80-2.90m) deposits. Between 1.80m and 2.50m occur deposits of fluvial origin. A sequence of chalk diamict (2.90-3.70m) was present at the base of the sequence. This Pleistocene solifluction deposit grades into degraded chalk bedrock. Occasional redeposited worked and burnt flint were recovered from the Holocene colluvium. No archaeological features or deposits were encountered.

4.2.2 Trench 3783TT (figure 3): The sequence in this trench consists of topsoil (0.00-0.25m) overlying Holocene colluvium (0.25-0.35m) on top of deposits (0.35-1.75m) of sand and flint gravel. Below these is a sequence of chalk diamict (1.75-3.80m). The sand, flint gravel and chalk, which produced very sparse redeposited Palaeolithic artefacts, are inferred to be Pleistocene solifluction deposits. A short-lived stream channel occurs at 0.80m O.D. No archaeological features or deposits were encountered.

4.2.3 Trench 3784TT: The sequence in this trench consists of topsoil (0.00-0.30m) overlying deposits of sands or sandy flint-gravel (0.30-3.90m) of Pleistocene Age, resulting from solifluction and fluvial processes. The base of the sequence consists of chalk layers, interpreted as Pleistocene solifluction. No archaeological artefacts, features or deposits were encountered.

4.2.4 Trench 3785TT: The sequence consists of topsoil (0.00-0.20m) overlying a succession of Holocene deposits (0.20-5.40m). Directly beneath by the topsoil are two deposits of Holocene colluvium. The upper surface of a wood peat (mid-Holocene wetland) occurs at 3.10 mOD, on top of an early/mid-Holocene freshwater channel with reeds. A deposit of early Holocene chalk and sand exists at the base of the sequence (4.90-5.40m). No archaeological artefacts, features or deposits were encountered.

4.2.5 Trench 3787TT (figure 3): The sequence of this trench consists of topsoil (0.00-0.30m), on top of sandy silt Holocene colluvium (0.30-2.00m), overlying a succession of sand or sandy-silt Pleistocene colluvial deposits (2.00-6.25m). Small quantities of redeposited Neolithic/ Bronze Age worked flint and pottery were recovered from the Holocene colluvium. No archaeological features or deposits were encountered.

4.2.6 Trench 3789TT: (figure 3) The sequence in this trench consists of topsoil (0.00-0.40m) overlying a succession of sandy-silt colluvial deposits. The sediments present are interpreted as being of Holocene (0.40-1.80m) and Pleistocene (1.80-6.20m) age. The base of the sequence was not reached in this trench. A single undated linear feature (3789003) and a posthole (3789006) were recorded. A few, probably residual, Neolithic/ Bronze Age flint artefacts were recovered from the fill of the ditch and the Holocene colluvium.

4.2.7 Trench 3790TT: The sequence of this trench consists of topsoil (0.00-0.25m) on top of a succession of Pleistocene deposits. Layers of silty-sand and sandy-silt colluvium (0.25-2.95m) overlie a Pleistocene floodplain deposit. The upper surface of a layer of fluvial gravelly sand and flint gravel occurs at 3.30 O.D., on top of chalk diamict Pleistocene solifluction deposits (4.00-4.40m). The base of the Pleistocene sequence was not reached in this trench. No archaeological artefacts, features or deposits were encountered.

4.2.8 Trench 3791TT: The sequence consists of topsoil (0.00-0.30m) and 20th century made ground (0.30-4.00m) overlying a deposit of sandy silt Holocene colluvium (4.00-4.10m). The base of the Holocene sequence was not reached. No archaeological artefacts, features or deposits were encountered.

4.2.9 Trench 3801TT: The sequence of this trench consists of topsoil (0.00-0.30m) overlying Holocene colluvium (0.30-1.10m) on top of sand matrix and chalk deposits (1.10-4.30m) of Pleistocene age (colluvium and solifluction). The base of the geological sequence was not reached in this trench. No archaeological artefacts, features or deposits were encountered.

4.2.10 Trench 3804TT: The sequence consists of topsoil (0.00-0.30m) overlying silty sand colluvium of Holocene Age (0.30-1.05m) and two Pleistocene deposits (1.05-4.30m). The upper layer of sand Pleistocene colluvium occurs at 1.05m O.D., on top of chalk and flint gravel solifluction deposits. The base of the Pleistocene geological sequence was not reached in this trench. No archaeological artefacts, features or deposits were encountered.

Zone 2 - South Valley Side

4.2.11 Trench 3829ATT: The sequence consists of topsoil (0.00-0.10m) and made ground (0.10-1.30m) overlying deposits of sand and chalk diamict Pleistocene solifluction (1.30-4.80m). At the bottom of the sequence is a deposit of chalk gravel resulting from Pleistocene fluvial or solifluction processes. The base of the Pleistocene sequence was not reached. A group of 6 Palaeolithic artefacts was recovered from the Pleistocene solifluction deposits.

4.2.12 Trench 3829BTT: (figure 4) The sequence consists of topsoil (0.00-0.10m) overlying sand and chalk diamict solifluction deposits (0.30-1.50m) of Pleistocene age. A deposit of chalk diamict Pleistocene solifluction is present at the base of the sequence, grading into degraded chalk bedrock. One Palaeolithic artefact was recovered from the Pleistocene solifluction deposits.

4.2.13 Trench 3805TT: (figure 4) The top of the sequence of this trench consists of topsoil (0.00-0.30m) and made ground (0.30-1.50m) overlying silty-sand and sand floodplain or colluvial deposits. These sediments are probably Pleistocene, but could be Holocene if they are colluvium. The upper surface of a flint gravel layer at 2.30mOD, (probably a minor Pleistocene fluvial channel deposit), produced two Levalloisian flint artefacts, including a large blade found *in situ* lying horizontally

towards the base of the gravel unit. This deposit occurs on top of a succession of sandy silt deposits (2.55-3.00m), probably Pleistocene colluvium. The lowest layers encountered consist of a sandy-silt colluvium (3.00-5.50m) and a chalk diamict solifluction deposit (5.50-6.00m), both of Pleistocene age. The base of the Pleistocene sequence was not reached.

4.2.14 Trench 3808TT: (figure 4) The sequence consists of topsoil (0.00-0.20m) and made ground (0.20-0.30m) on top of a truncated deposit of sandy silt Holocene colluvium (0.30-1.90m) overlying a succession of Pleistocene deposits. At the top of the Pleistocene sequence is a late fluvial gravel, high energy braided channel deposit. The upper surface of a sandy-silt solifluction deposit occurs at 2.60m O.D. A sequence of chalk diamict Pleistocene solifluction deposits (3.25-3.75m) are present at the base of the trench. Two Palaeolithic artefacts were recovered from the base of the Holocene and top of the Pleistocene sequence (3808004).

4.2.15 Trench 3798TT: The sequence consists of topsoil (0.00-0.20m) and made ground (0.20-4.80m) overlying a deposit of silty-sand truncated alluvium, of probable Pleistocene age but possibly Holocene. The base of the sequence was not reached. No archaeological artefacts, features or deposits were encountered.

4.2.16 Trench 3806TT: The sequence consists of a hard tennis court surface (0.00-0.25m) on top of a silty-sand Holocene colluvium (0.25-1.05m) overlying a succession of Pleistocene deposits. At 1.05m lies a sandy-silt floodplain deposit with colluvial sedimentation. At the base of the sequence are Pleistocene fluvial sands (1.70-2.85m) and gravel (2.85-4.00m). One Palaeolithic artefact was recovered from the fluvial gravel. A single Romano-British cremation (3806006) was found within the Holocene colluvial sequence.

4.2.17 Trench 3807TT: (figure 5) The sequence consists of topsoil (0.00-0.40m) overlying post-Roman colluvial or floodplain deposits (0.40-1.40m). Below these, a dense group of Roman archaeological features were found cut into Holocene colluvium. The Roman features were mostly intercutting ditches, although a possible beam slot (3807028) and a posthole were also identified. Large concentrations of Roman pottery and tile and a copper alloy brooch were recovered, which suggest a date in the mid to late 2nd century for this activity. The high density of features, in contrast with little or no activity in adjacent trenches, the large amount of building material present and the possible beam-slot, all suggest that a Roman building may have been present in the immediate vicinity. The underlying Pleistocene deposits comprise a sandy clay-silt colluvial or floodplain deposit at 1.40 mOD overlying deposits of flint gravel and silty sand, representing fluvial or solifluction deposits (1.85-4.45m). A single undiagnostic waste flake was recovered from a Pleistocene gravel deposit (3807058 - probably of fluvial origin). The base of the Pleistocene sequence was not reached.

4.2.18 Trench 3802TT: This test pit was excavated on the football pitch terrace to test the depth of made ground. The sequence consists almost entirely of made ground (0.00-5.30m) Excavation continued into the top of a sandy-silt colluvium of probable Pleistocene age (not bottomed) at a depth of 5.30-5.80m.

4.2.19 Trench 3803TT: This test pit was excavated on the football pitch terrace to test the depth of made ground. The sequence consists almost entirely of made ground (0.00-5.30m) Excavation continued into the top of a truncated chalk diamict Pleistocene solifluction deposit (not bottomed) at a depth of 4.30-5.30m.

Zone 3 - Valley Bottom

4.2.20 Trench 3793TT: The sequences in this trench consist of made ground/topsoil (0.00-2.60m) overlying horizontally bedded clay-silts and organic silts (2.60-4.00m). The upper surface of the fine grained silt deposits occurs at 1.6m O.D. The sediments present are all inferred to be of Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. The evidence from this trench indicates that Holocene deposits extend west of the main trackway along the valley edge marking the position of the alluvium as mapped by the British Geological Survey. This indicates that a substantial thickness of Holocene sediments extend into the area of the CTRL mainline. No archaeological features or deposits were encountered.

4.2.21 Trench 3794TT (figure 6): The sequences in this trench consist of made ground/topsoil (0.00-3.40m) overlying horizontally bedded clay-silts and organic silts (3.40-6.70m). A sequence of sands and gravels are present at the base of the sequence (6.70-7.00m). The upper surface of the fine grained silt deposits occurs at 1.45m O.D. and the upper surface of the sands and gravels at –1.85m O.D. The sediments present are interpreted as being of Holocene and Pleistocene age. The Holocene sediments (3.40-6.70m) represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surfaces. A thick woody peat (-0.45 tp – 1.65m O.D.) is also present and seals a thin clay-silt unit below. Sands and gravels at the base of the sequence are likely to be of Pleistocene age. The evidence from this trench indicates that Holocene deposits extend west of the main trackway along the valley edge marking the position of the alluvium as mapped by the British Geological Survey. This indicates that a substantial thickness of Holocene sediment extends into the area of the CTRL mainline. No archaeological features or deposits were encountered.

4.2.22 Trench 3795TT: The sequences in this trench consist of made ground/topsoil (0.00-3.80m) overlying organic rich units (3.80-4.50m). The base of the sequence consists of bedded gravels and silt units (4.50-7.00m). The upper surface of the fine grained silt deposits occurs at 3.20m O.D. and the surface of the sands and gravels at 1.70m O.D. The sediments present are inferred to be of Holocene and Pleistocene age. The sequence shows the thinning and rising Holocene floodplain sediments (3.80-4.50m) wedging and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. The evidence from this trench indicates that Holocene deposits extend west of the main trackway along the valley edge marking the position of the alluvium as mapped by the British Geological Survey. It is likely that this trench lies close to the edge of the alluvium. This indicates that substantial thickness' of Holocene sediments extend into CTRL cutting. Pleistocene sediments present within this trench may equate with sediments previously examined in the vicinity of borehole ARC 0021 SA. No archaeological features or deposits were encountered. Residual artefacts were recovered in insignificant quantities.

4.2.23 Trench 3796TT: The sequences in this trench consists of made ground/topsoil (0.00-3.45m) overlying bedded clay-silts, organic silts and peats (3.45-7.20m). At the base of the trench 0.6m of sandy-gravel is present. The upper surface of the fine grained silt deposits occurs at 1.75m O.D. and the upper surface of the sandy-gravels at –1.95m O.D. The sediments present are all well bedded, horizontal clay-silt, organic silt or peat units and are inferred to be of Holocene age. A well developed wood peat is present between –0.35m and –1.20m O.D. These sediments suggest low energy sediment accumulation in upper tidal reach mudflats or tidal

marsh surfaces or woodland conditions. The evidence from this trench indicates that Holocene deposits extend west of the main trackway along the valley edge marking the position of the alluvium as mapped by the British Geological Survey. The basal part of the sequence consists of deposits considered to be of Pleistocene age. No archaeological features or deposits were encountered.

4.2.24 Trench 3797TT: (figure 6) The sequences in this trench are complex and considerable variation has been recorded along the length of the trench. In order to fully document the nature of the stratigraphic sequences contained in these trenches, four profiles were recorded in addition to the section drawings. The stratigraphy in the trench is considered by reference to composite profiles recorded at either end of the trench. 3797 TT (1-west) and 3797 TT (2-east) are described below.

4.2.25 *3797 TT (1-west)*: The stratigraphy present at the western end of the trench consists of made ground/topsoil (0.00-2.00m) overlying horizontally bedded clay-silts and silts (2.00-3.75m). Sands and gravels are present between 3.7m and the base of the trench at 6.35m. The upper surface of the fine grained silt deposits occurs at 3.24m O.D. and the upper surface of the sands and gravels at 1.49m O.D. The sediments present between 2.00m and 3.75m are thought to have accumulated as a result of colluvial processes operating to bring sediment downslope and accumulate material at the base of the slope. Within the sequence two well-preserved palaeosols, inferred to be of Holocene age, were recorded (3797005 and 3797007-9). The sediments beneath this sequence (3.70-6.35m) are thought to be of Pleistocene age and may be of fluvial origin. These sequences of deposits have been truncated, possibly by landscaping, as a clear cut (3797004) is recorded to the east of this profile.

4.2.26 *3797 TT (2-east)*: The sequence consists of made ground/topsoil (0.00-3.15m) overlying bedded clay-silts (3.15-4.45m). The upper surface of the fine grained silt deposits occurs at 1.3m O.D. The sediments present are inferred to be of Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. These deposits lie in close proximity to sediments inferred to be colluvial in origin (3797 TT (1-west) and therefore represent alluvial marginal deposits laid down close to the valley edge. The evidence from this trench indicates that Holocene deposits extend west of the main trackway along the valley edge marking the position of the alluvium as mapped by the British Geological Survey. Unfortunately human activity (e.g. cut 3797004) has removed the stratigraphy from the area in which direct relationships between the colluvial and alluvial sediments would have existed.

4.2.27 Two archaeological features were identified: 3797004 is a linear ditch of probable modern date. Its primary fill contained one fragment of 18th to 20th century glass. 3797011 is a small pit of unknown date. A small group of redeposited prehistoric artefacts, including pottery and flint, was recovered from the Holocene colluvium.

4.2.28 Trench 3799TT: (figure 6) The sequences in this trench consist of made ground/topsoil (0.00-1.90m) overlying horizontally bedded clay-silts and organic silts (1.90-4.80m). Gravel was encountered at the base of the trench (4.80m and below). The upper surface of the fine grained silt deposits occurs at 2.28m OD and the top of the gravels at –0.62m OD. The sediments present are all interpreted to be of Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. Organic rich sediments, possibly the lateral equivalent of the main peat body within the area, lie between 1.4m and –0.65m OD. The evidence from this trench indicates that Holocene deposits extend west of the main trackway along the valley edge marking the position of the alluvium as

mapped by the British Geological Survey. This indicates that a substantial thickness of Holocene sediments extend into the area of the CTRL mainline cutting. Pleistocene sediments are present at the base of the sequence (below 4.80m) and are likely to be cold climate braided channel sediments. One archaeological feature was identified, comprising a possible pit (3799006) of unknown date. Context 3799004 is a spread of burnt material.

4.2.29 Trench 3809TT: The sequences in this trench consist of made ground/topsoil (0.00-1.80m) overlying horizontally bedded clay-silts, organic silts and peats (1.80-5.40m). The upper surface of the fine grained silt deposits occurs at 1.1m O.D. The sediments present are all inferred to be of Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. A woody peat lies between datums of –0.3m and –0.8m O.D. No archaeological features or deposits were encountered.

4.2.30 Trench 3811TT: The sequences in this trench consist of made ground/topsoil (0.00-1.50m) overlying a complex of horizontally bedded clay-silts, organic silts and peats (1.50-5.10m), the basal part of the sequence consists of gravel (5.10-6.50m). The upper surface of the fine grained silt deposits occurs at 1.61m O.D. and the top of the gravel at –1.99m O.D. The sediments present are inferred to be of Holocene and Pleistocene age. The fine grained silts and organic sediments represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. A woody peat exists between datums of –0.09m and –0.64m O.D. The lowermost gravel is of probable Pleistocene age and was probably deposited under fluvial conditions in braided channels during the last cold phase. No archaeological features or deposits were encountered.

4.2.31 Trench 3800TT: (figure 6) The sequences in this trench consist of made ground/topsoil (0.00-2.40m) overlying bedded clay-silts and organic silts (2.40-3.20m). The lower part of the sequence consists of horizontally bedded clay-silts and gravels (3.20-5.20m). The upper surface of the fine-grained silt deposits occurs at 1.54m O.D., the upper surface of the clay-silts and gravels occurs at 0.74m O.D. The sediments present consist of a thin, wedge shaped sequence of deposits (3800002) which are all inferred to be of Holocene age. These deposits show an increase in organic content with increased thickness of the sediment body and are likely to represent mudflat environments of deposition. They overlie a series of horizontally bedded deposits thought to be of Pleistocene age. The contact between the Pleistocene and Holocene deposits consists of a dipping surface that appears to have been eroded. The evidence indicates that the trench lies within the area of transition at the edge of the alluvial tract. These observations are compatible with previous observations and confirm the evidence from elsewhere suggesting that Holocene deposits extend west of the main trackway along the valley edge. The Pleistocene deposits may be equivalent to other deposits previously noted in ARC 0021 SA. No archaeological features or deposits were encountered.

4.2.32 Trench 3810TT: The sequences in this trench consist of made ground/topsoil (0.00-1.30m) overlying a complex of horizontally bedded clay-silts and organic silts (1.30-3.90m), a series of sands and gravels form the basal part of the sequence between 3.90m and 5.35m. The upper surface of the fine grained silt deposits occurs at 1.73m O.D. and the top of the sand/gravel sequence at –0.87m O.D. The sediments present are inferred to be of Holocene and Pleistocene age. The fine grained clays and silt represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. A main peat unit is present between 0.38m and 0.03m O.D. and may reflect wooded conditions at the site. The basal sands and

gravels are likely to be of Pleistocene age and are probably fluvial deposits laid down in high energy, braided fluvial systems. One undated wooden post (context 3810022) was located within the centre of the trench. It was 0.05m in diameter and survived to a length of 0.45m and had an axe-sharpened point which suggests a Roman or later date. The level from which it was originally driven is uncertain, but it survived to the top of deposit 3810008 (1.46m OD) and was driven into deposit 3810012 (1.02m OD).

4.2.33 Trench 3812TT: (figure 7) The sequences in this trench consists of made ground/topsoil (0.00-1.80m) overlying a complex of fine horizontally bedded clay-silts, organic silts and peats (1.80-4.35m). The upper surface of the fine-grained silt deposits occurs at 1.67m O.D. The sediments present are all inferred to be of Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. In the middle of the trench was an apparently man-made surface constructed from large, well-sorted flint cobbles, laid in a dense mass over a roughly circular area c. 5m in diameter. This was laid on top of a wood peat, present between datums 0.37m and –0.28m O.D. No associated dating evidence was recovered, but the stratigraphic position on top of the peat is similar to that of the wattle structure found in 3815TT, so a later prehistoric date (possibly Bronze Age) is considered most likely. A clay-silt deposit of probable Pleistocene age was encountered below the wood pit at -0.28m OD, overlying a sequence of Pleistocene gravels and braided channel deposits.

4.2.34 Trench 3813TT: The sequences in this trench consist of made ground/topsoil (0.00-1.10m) overlying a complex of predominantly horizontally bedded clay-silts and organic silts (1.10-5.80m). The upper surface of the fine grained silt deposits occurs at 1.98m O.D. The sediments present are all inferred to be of Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. Wood peat sediments occur between datums of –0.47m and –1.02m O.D. Some indication of dipping units towards the base of section may suggest local channel incision and erosion but this was probably of limited extent. Excavation was continued to a depth of 5.8m (-2.72m OD) without encountering the Pleistocene gravels.

4.2.35 Trench 3814TT: The sequences in this trench consist of made ground/topsoil (0.00-1.80m) overlying predominantly horizontally bedded clay-silts, organic silts and peats (1.80-4.00m). gravels exist at the base of the sequence (4.00-6.00m). The upper surface of the fine-grained silt deposits occurs at 1.77m O.D. and the top of the gravels at –0.43m O.D. The sediments present are inferred to be of Holocene and Pleistocene age. The fine grained sediments represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. A wood peat exists between 0.42m and –0.43m O.D. A single north-south ditch (3814009) was recorded in section. Although not dated, the level at which the feature is cut (1.3m OD) suggests that it is most likely to be Roman or later in date. It certainly cuts peat layer 3814010 and may cut the overlying clay-silt (3814008). Peat layer 3814007 appears to slump into the ditch. The basal gravels comprise flint gravel (3814017), overlying clay-silt with flint gravel (3814018). The deepest deposit encountered was a silty gravel (381419) with chalk becoming more frequent with depth . The gravels are likely to be of Pleistocene age, probably dating from the end of the last cold phase.

4.2.36 Trench 3815TT (figure 8): The sequences in this trench consist of made ground/topsoil (0.00-1.40m) overlying horizontally bedded clay-silts, organic silts and peats (1.40-3.50m). The upper surface of the fine grained silt deposits occurs at

1.8m O.D. The sediments present are all inferred to be of Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. A wood peat was observed between datums of 0.6m and –0.05m O.D. A dense area of brushwood stakes (3815013) was discovered lying horizontally on the upper surface of the peat in context 3815030. It was probably from a collapsed woven roundwood structure (see Appendix 5.1). Three samples, one from wood associated with the structure and two from the main body of the peat below the structure (context 3815016), have produced middle Bronze Age radiocarbon dates (see Appendix 12). Pleistocene gravels were not reached in this trench.

4.2.37 Trench 3837TT: The sequence comprises topsoil (0.00-0.22m) immediately overlying a series of Holocene colluvial layers (0.22-1.50m). Further deposits of either colluvial or alluvial origin, dated to the Holocene by residual prehistoric and Roman artefacts (including several unabraded fragments of tile), are present from 1.50-2.10m. Braided channel deposits inferred to be of late Pleistocene age, were encountered from 2.10-5.50m and overlying solifluction deposits (5.50-6.00m).

4.2.38 Trench 3817TT: The sequences in this trench consist of topsoil /made ground (0.00-1.50m) overlying horizontally bedded clay-silts, organic silts and peaty-clays (1.50-3.25m), gravel dominated sediments exist at the base of the sequence (3.25->5.10m). The upper surface of the fine grained silt deposits occurs at 1.71m O.D. and the top of the gravels at –0.04m O.D. The sediments present are inferred to be of Holocene and Pleistocene age. The fine grained sediments represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. No real peat exists at this location, although peaty-clay is noted. These observations confirm previous observations made within the area regarding the nature of the Holocene sediments (e.g. Ebbsfleet Rise work). However, the more minerogenic nature of the units containing organic material indicates that depositional environments may have changed in this area. The basal gravel-rich units are assumed, on the basis of present interpretation of the wider valley sequence, to be of Pleistocene age.

4.2.39 Trench 3816TT: The sequences in this trench consist of made ground/topsoil (0.00-1.20m) overlying horizontally bedded clay-silts, organic silts and peats (1.20-3.30m), gravel dominated sediments occur at the base of the sequence (3.30->6.00m). The upper surface of the fine grained silt deposits occurs at 2.09m O.D. and the top of the gravel rich sediments at –0.01m O.D. The sediments present are inferred to be of Holocene and Pleistocene age. The fine grained sediments represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. Wood peat was present between datums of 1.29m and 1.04m O.D. The Pleistocene deposits at the base of the sequence are of probable late Devensian age.

4.2.40 Trench 3828TT: The sequences in this trench consist of made ground/topsoil (0.00-0.50m) overlying horizontally bedded clay-silts (0.50-3.00m), chalk rich sands and gravels exist between 3.00 and >6.00m depth. The upper surface of the fine grained silt deposits occurs at 2.93m O.D. and the surface of the chalk rich sediments at 0.43m O.D. The sediments present are inferred to be of Holocene and Pleistocene age. The finer grained sediments are of probable Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. A possible lateral equivalent of the main peat (3828005, 3828006) may exist between 1.23m and 0.95m O.D. The increased minerogenic content probably reflects the position of the trench close to the dry ground. Pleistocene deposits

occur at the base of the sequence and are probably solifluction deposits laid down during the Devensian cold period.

4.2.41 The sediments present are all inferred to be of Holocene age and represent low energy sediment accumulation in upper tidal reach mudflats or tidal marsh surface. The evidence from this trench indicates that Holocene deposits extend west of the main trackway along the valley edge marking the position of the alluvium as mapped by the British Geological Survey. This indicates that a substantial thickness of Holocene sediments extends into the area of the CTRL mainline cutting. The sequences in this trench consist of made ground/topsoil (0.00-2.60m) overlying horizontally bedded clay-silts and organic silts (2.60-4.00m). The upper surface of the fine grained silt deposits occurs at 1.6m O.D.

4.2.42 Trench 3818TT: (figure 9) This trench is complex and lateral change in sediment types is noted along the recorded profile. The stratigraphy contains substantial elements of probable human origin. The sequences consist of made ground/topsoil (0.00-1.40m) overlying clay-silt units (1.40-2.10m); sediments below 2.10m consist predominantly of gravel. The upper surface of the fine grained silt deposits occurs at 1.71m O.D. and the surface of the gravels at 1.01m O.D. The sediments present are inferred to be of Holocene and Pleistocene age. The finer grained silts often exhibit dipping relationships, sometimes associated with archaeological remains, and these appear to indicate the presence of channels. Horizontal bedding in places (e.g. associated with 3818006, 3818007) may indicate the presence of former land-surfaces adjacent to areas of active channelling. This pattern of sedimentary architecture differs significantly from that observed within the alluvium over much of the area of this study and indeed the evidence obtained from the Ebbsfleet Rise study (OAU 1997) and STDR-4 investigations (OAU 2000). Consequently this area appears to be one of more active water flow, which was subject to erosion and channel infill and probably represents some of the best evidence to date, from this part of the Ebbsfleet, for the location of the active channel in antiquity. The basal deposits are likely to be Pleistocene in age and probably date to the late Devensian.

4.2.43 A few Roman features were identified. Curvilinear gully 3818016 contained some Roman tiles. Trench 3818TT contained part of a lightweight plank revetment and other fragments of worked wood, found in association with Roman artefacts and located c.30m north of Northfleet Roman Villa. A possible land surface could be seen in section on the north side of the revetment, suggesting that the structure may have revetted a Roman period channel located immediately north of the villa buildings. The east-west alignment of the plank revetment is roughly the same as the villa complex. The revetment was a simple, low structure comprising two cleft oak stakes, with a tangentially faced, almost certainly sawn, oak plank set on edge behind them. The oak plank appears to have been split along the pith line and was probably originally almost twice as wide. However, as the stakes are widely spread and relatively modest in size it is unlikely that the structure ever stood more than two planks high (c.0.9m).

4.2.44 Deposit 3818025, located at the south-west end of the trench, is possibly a dump of occupation refuse from the villa. It contained some Roman tile, flint nodules, bones, limestone pieces and wood fragments. Included in this deposit was a sparse, amorphous deposit of small roundwood, including some worked fragments of larger timber in a peaty silt matrix, including one interesting piece of uncertain function (See Appendix 5).

4.2.45 Trench 3819TT: The sequence comprised topsoil and made ground (0.00-1.30m) overlying a series of Holocene alluvial deposits (1.30-3.20m) including a possible

stream deposit (3819004) and two peat horizons (3818003 and 3819005). Roman tile, stone, prehistoric worked flint and animal bones were recovered from a silty clay deposit (3819007) at 2.30-3.00m, indicating that the overlying sequence of deposits is of Roman or later date. Underlying the Holocene sequence was a series of Pleistocene channel deposits (3.20-4.00m) comprising poorly sorted flint gravel (3819009) overlying a layer of mid-grey silt containing shells (3819010), overlying angular flint gravel (3819011)

Zone 4 - Gravel Spur (Northfleet Roman Villa)

4.2.46 Trench 3831TT: (figure 12) The structural remains found in this trench are the remnants of the 'bathhouse' of the Northfleet Roman villa, previously excavated during the TAG excavations of 1977-84. The Pleistocene sequence was not investigated by test pitting at this location due to the high density of Roman features and the risk of damage to intact stratigraphy. The Roman features were cut into clay-silt colluvium of uncertain age. The surviving Roman stratigraphic sequence is fairly limited, having been largely removed during the previous excavations, with the exception of some retained baulks. Many of the relationships between structures have been lost irretrievably. The majority of the remains are structural masonry, and have been preserved to various heights, not exceeding 0.90m.

4.2.47 Context 3831004 was a 0.38m thick Roman occupation horizon on which all Roman structures were constructed. An early linear gully (3831007) was cut through it. A north-south aligned construction cut (3831018) contains the remnants of a robbed out wall or drain, which is overlain by the east-west aligned 'bathhouse' wall (3831011), surviving to a height of 0.40m at this point. The eastern continuation of the bathhouse wall (3831006), which survives to a height of 0.60m, shows evidence for two phases of construction: the main wall and an internal partition wall abutting it on its south face.

4.2.48 Group 3831005 is an annexe, uncovered at the north end of the excavated area, which comprises three walls forming a small square room. The walls survived to a height of 0.90m. Two fragmentary floor surfaces survive in the internal area, constructed from *Opus Signinum*. The first floor was probably part of the initial construction phase as it is contained by all three walls. At a later phase, the floor was raised by a levelling layer and the construction of a new floor, associated with a small hearth, 0.45m deep. At the back of the hearth, there appears to be the remains of a tile arch which is constructed in the fabric of the east wall. The arch originally led through into the annexe and may have served as a stoke-hole, contemporary with the hearth. Six roughly squared limestone blocks observed on the south side of the annexe could be the remains of a south wall or footing. It may have been removed by the TAG excavations or during the Roman period.

4.2.49 Two square footings, possibly pillar bases, continue the alignment of the east wall of 3831005, finishing at the gap between walls 3831006 and 3831011. A cobbled surface (3831008) in the middle of the central area has been removed in places by the TAG excavations, so its relationship with the surrounding structures is uncertain. A second hearth (3831017) with stoke-holes 0.30m deep, was identified at the east end of the trench. This appears to be external to the building. As the evaluation was confined to removing back-filled material from the TAG trenches and cleaning the sections, no *in situ* artefacts were recovered from this trench.

4.2.50 Trench 3832TT: (figure 15) Four walls were found, in an area previously excavated by both Steadman in 1909-11 and TAG in 1978-84. Walls 3832003 and 3834004 seem to form the south-west corner of a building or wing. Wall 3832002 is located

at the south of the trench and runs parallel to 3831003. The two could possibly form an external corridor or portico, although the gap between them is very narrow and they are rather more likely to be of different phases. Another foundation, 3832005 was identified in the south-west corner of the trench. Its function is unknown but it appears to be a completely different build to the other three walls. Other features include an irregular feature (3832007) comprising a roughly linear section and and a sub-circular pit of possibly modern date. The wall footings were all severely truncated, with only the cobbled base of the foundations surviving. As the evaluation was confined to removing back-filled material from the TAG trenches and cleaning the sections, no *in situ* artefacts were recovered from this trench. The Pleistocene sequence was not investigated by test pitting at this location due to the high density of Roman features and the risk of damage to intact stratigraphy. The Roman features were cut into clay-silt colluvium of uncertain age.

4.2.51 Trench 3820TT: (figure 11) A few features of Roman date, undoubtedly associated with the villa complex, have been identified, including one wall footing (382010) and one robbed out wall (3820008) containing fragments of stone and mortar. Also present was a squared pit (3820016) of unclear purpose, cut by a further pit (3820014) and by wall 3820010. 3820018 seems to be a natural dip in land surface which has been levelled up with redeposited alluvium and destruction debris. East of, and parallel to, wall 3820010 is a robber trench (3820008). A stone-lined Roman well (3820006) was associated with a cobbled surface (3820004). Wall 3820010 might have been a boundary wall or external wall of a building, bounding a courtyard containing the well and cobbled surface. It lines up with a footing to the south recorded by Steadman. The pottery recovered from the features in this trench is broadly of the 2nd century AD. The Pleistocene sequence was not investigated by test pitting at this location due to the high density of Roman features, the risk of damage to intact stratigraphy and the presence of live services. The Roman features were cut into clay-silt colluvium of uncertain age.

4.2.52 Trench 3830TT: (figure 15) No archaeological features were found in this trench. This is surprising, given its location at the heart of the Roman complex, but is consistent with Steadmans report, which indicates that his excavations in this part of the site (which are of unknown extent) also produced entirely negative results. It is possible that the truncation affecting the Roman features elsewhere has completely removed any trace of wall footings or surfaces in this area. Alternatively, the trench may be in a courtyard or garden area. The upper part of the stratigraphic sequence comprised post-Roman ploughsoils to a depth of 0.95m (3830001, 3830002), overlying a possible Roman occupation or soil layer c. 0.2 m thick (3830003), which produced Roman tile, pottery and a residual prehistoric worked flint. This layer directly overlay a silty sand colluvium of uncertain age (3830005, 3830006), 2.3m thick at this location. Below this lay deposits also of uncertain date but more likely to be Pleistocene than Holocene, comprising a fine sand colluvium/ solifluction deposit (3830007) to a depth of 4.0m, overlying chalk and flint gravel solifluction (3830008) to a depth of 4.5m. This layer was observed to dip slightly to the north. From 4.5m to 5.4m depth was a sand colluvial/ solifluction deposit (3830010) - containing occasional mollusc fragments. At the base of the trench was a coarse chalk and flint gravel, probably a Pleistocene solifluction deposit but possibly fluvial in origin (3830011).

4.2.53 Trench 3834TT: (figure 13) A few Roman features were identified, two of which may be large quarry pits or landscaping/ levelling features associated with the adjacent riverbank (3834013, 3834004). The fills were comparatively rich in artefacts and may represent domestic refuse from the villa. The pottery is broadly

late 1st to 2nd century AD in date. 3834006 was a large pit, cut on both sides by the 'quarry' pits (3834013, 3834004) . Four shallow pits were also discovered (from west to east: 3834011, 3834008, 3834015, 3834017). At the east end of the trench, ditches 3834024 and 3834019 run parallel to each other, on a SW-NE alignment. They both contained 1st to 2nd century AD pottery.

4.2.54 Curvilinear gully 3834032 is cut by Roman ditch 3834019. It may be a ring gully of earlier date as it contained 12 flint artefacts of Bronze Age and Neolithic date and two sherds of prehistoric pottery. The pottery is thought to be late Bronze Age, but could be earlier (see Appendix 1 for discussion of prehistoric pottery dating).

4.2.55 Trench 3833TT (figure 15): Two linear ditches were identified. The first (3833006), which contained 3 sherds of 1st-2nd century pottery and 2 wall plaster fragments, is likely to be associated with the villa. The second (3833004) is east-west aligned and contained two pottery sherds of possible Anglo-Saxon date, as well as prehistoric flint and Roman pottery which are presumed to be residual. The Roman and possible Anglo-Saxon features were sealed at a depth of 0.85m beneath a series of ploughzone deposits comprising 0.15m of disturbed modern fill material (3833001), a 0.45m thick silty sand layer (3833002) and a 0.15m thick silty sand subsoil containing Roman pottery (3833013). The features were cut into a probably Roman sandy clay-silt ploughzone deposit (3833010) which lay between 0.85m and 1.15m deep. Underlying these Holocene deposits were a series of Pleistocene colluvial/ solifluction deposits comprising silty sand colluvium (3833003), to a depth of 2.45m, and sandy colluvium/ solifluction (3833011) to 4.20m (containing sparse molluscs including *Pupilla Muscorum*). At the base of the trench (not bottomed at 4.90m deep) was a chalk and flint gravel deposit (3833012) interpreted as a Pleistocene fluvial deposit but possibly resulting from solifluction.

4.2.56 Trench 3835TT (figure 15): Three features were identified at a depth of 1.65m, only two of which are definitely archaeological. They comprised a small drainage or boundary ditch (3835007) and a ditch or pit (3835014) (only seen in test pit section). Both produced small quantities of later prehistoric worked flint which could be residual. An Roman or later date seems most likely for these features. The third feature is an irregular cut of possible prehistoric date (3835006), with some evidence for burning including a concentration of burnt flint. The irregular shape suggests that the feature could be natural hollow, filled with prehistoric occupation debris from the immediate vicinity.

4.2.57 The stratigraphic sequence in this trench was capped by 0.4m of topsoil (3835001) overlying two layers of clay-silt ploughsoil (3835002, 3835003) extending to a depth of 1.20m, the upper of which produced small quantities of Roman CBM and pot, as well as residual prehistoric worked and burnt flint. The depth of the deposits sealing archaeological features is due to the deposits dipping down and thickening towards the present riverbank. Beneath this, to a depth of 1.55m, lay a Holocene clayey sand alluvial deposit (3835004) and a 0.10m thick sandy silt fluvial deposit (3835005) which sealed the archaeological features (3835007, 3835014) and must therefore be of Holocene date. All three features were cut into the top of a sequence of sandy silt fluvial deposits of uncertain age (3835015, 3835016), which were recorded to a depth of 2.30m. Excavation was continued in a test pit to a depth of 4.55m, through a further sequence of soft sands of uncertain age but probable fluvial origin (3835020), which contained mollusc shells. At the base of the trench a light grey silt (3835021), which was encountered at a depth of 4.95m, is interpreted as being a Pleistocene deposit, probably of fluvial/ alluvial origin. The trench was abandoned at 4.95m because of trench collapse.

4.2.58 Trench 3836TT: (figure 14)

4.2.59 In general the stratigraphic sequence in this trench consists of colluvial and alluvial deposits which dip down and thicken towards the present riverbank. At the North end of the trench modern made ground (3836002) was present below the topsoil (3836001) where it had been used to build up and level the river bank. This was 1.5m deep at the closest point to the river. At the southern end of the trench the upper part of the sequence consists of post-Roman topsoil (3836001) (0.00-0.20m), silty sand colluvium (3836002) (0.20-0.65m) and a sandy silt possible alluvial deposit (3836004) (0.65-1.0m). Sealed beneath these layers was a substantial Roman ditch (3836005), with at least one recut, which produced Roman tile and 2nd century AD pottery sherds. This was cut into a sequence of later sandy silt colluvial deposits (3836012, 3836013, 3836014) containing horizons possibly representing buried soils (3836015). This sequence produced the most significant assemblage of prehistoric artefacts from the site, (a total of 149 flints were recovered from a 1m square sample sondage excavated through deposits 3836012, 3836013, 3836014 and 3836015, the largest concentration (67) being from the possible buried soil horizon (38360015). The assemblage is generally Neolithic or early Bronze Age in character and showed evidence of usewear. A few sherds of flint-tempered pottery sherds were also recovered from 3836012 and 3836013, including one sherd of probable Ebbsfleet ware and 7 other undiagnostic sherds. The Ebbsfleet rim and some of the flint suggests a mid-late Neolithic date, but the pottery could otherwise be Bronze Age. The prehistoric material from this trench and Trench 3834TT suggest a significant focus of Neolithic and/or Bronze Age activity adjacent to the present channel bank of the Ebbsfleet.

4.2.60 Excavation continued, in a test pit, for a further 3.0m below the artefact bearing horizons (a total depth of 5.35m) through a sequence of sandy silt deposits (3836016, 3836017, 3836018) of uncertain, possibly early Holocene age. The later deposits are interpreted as colluvium (3836016 - 2.35-2.37m) the earlier as possibly fluvial in origin (383617, 383618).

4.3 Sub-surface topographical modelling

4.3.1 TerraStation II has been used to generate cross-sections and preliminary sub-surface topographical maps based on geotechnical and geoarchaeological borehole and test pit stratigraphic logs, including those from the present evaluation. Currently 376 data points have been entered into the database.

4.3.2 In order to examine the data and undertake cross-section and map construction, manual correlation of individual units needs to be undertaken. In TerraStation this can be achieved on-screen by defining a series of correlated surfaces/points called picks. Correlation of a series of key surfaces is undertaken on-screen for individual stratigraphic logs. Presently the database contains a number of correlated surfaces including the base of the made ground, top and base of main peat, surface of the Shepperton Gravel, top of the complex of sediments associated broadly with the penultimate interglacial and the top of the deposits associated with the last interglacial.

4.3.3 Preliminary correlation of stratigraphic data has been used to generate a series of cross-sections (Figures 20-24). The defined (picked) surfaces are subsequently used to create topographic map projections (Figure 25-28). The preliminary mapping provided is intended to address the project aims with regard to establishing the sub-surface topography of the investigation area. It has not proved possible to map the surviving topography of the chalk bedrock with the available data. However, the

map of the Shepperton gravel surface provides an indication of the topographical template over which the later deposits have accumulated. The mapping of the position of the dry ground/wet ground interface during the early Neolithic, Bronze Age and the period of Roman occupation is intended to assist in interpretation of the Holocene archaeological data in its topographical context. These projections are based on time/depth estimates for onset of organic sedimentation onto gravel surfaces in the lower Thames as previously calculated by Bates (1997). The projections show the gradual expansion of the wetland zone and the loss of dry ground habitats.

4.4 Artefactual evidence

Prehistoric pottery (Appendix 1.1)

4.4.1 The evaluation produced a small assemblage of 17 sherds (88g) of Neolithic-Bronze Age date and 11 sherds (83g) of Iron Age date. The pottery was generally in moderate condition; some sherds had slightly abraded edges, eroded surfaces and a relatively low average sherd weight of only 6.1g.

4.4.2 Flint-tempered sherds, possibly of Neolithic date, together with a possible Beaker sherd, came from 3787TT and 3797TT in the northern part of the site. The most significant concentration of flint-tempered sherds came, however, from 3836TT at the eastern margin of the site (figure 15). This material was associated with significant quantities of flintwork in a sequence of deposits potentially of middle to late Neolithic date (figure 14). Flint-tempered pottery from a gully in 3834TT, quite close to 3836TT, was thought to be of late Bronze Age, but an earlier date is possible.

4.4.3 Iron Age pottery came from 3806TT, 3834TT and 3836TT at the eastern end of the site. However, this material only occurred in contexts where it was associated with later material. The frequent association with later pottery suggests that these sherds belong to the later part of the Iron Age and derive from areas where there was activity through from the Iron Age into the early Roman period.

4.4.4 The present assemblage (together with that from the 1997 evaluation) is small and its potential for further analysis is therefore limited. It is however of some importance for understanding the chronology of the site, particularly in the pre-Roman period. If no further fieldwork is carried out, the only components of the present assemblage requiring more detailed consideration would be the Neolithic/Bronze Age material.

Romano-British pottery (Appendix 1.1)

4.4.5 The evaluation produced a small, multi-period pottery assemblage of which 87% by sherd count (94.5% by weight) was of Roman date. The pottery was generally in moderate condition. Preservation of the Roman material was variable, but the average sherd weight (17.2g) was considerably greater than for the prehistoric pottery.

4.4.6 The great majority of the Romanised fabrics was distributed across 11 trenches (figure 25), but only three of these (3807TT, 3820TT and 3834TT) produced more than 10 sherds, and more than half of the Roman assemblage (by sherd count) came from Trench 3807TT, lying over 100m west of the villa buildings. The pottery recovered dates principally to the 1st-3rd centuries AD. It is very difficult to define

the upper end of the date range, though the majority of the pottery does not suggest activity much beyond the middle of the 3rd century.

4.4.7 The present assemblage (together with that from the 1997 evaluation) is small and its potential for further analysis is therefore limited. At present the assemblage has no potential for providing data on trade and status and functional aspects of the site because of its small size. In the event of further fieldwork on the site the present material could be added to any resulting assemblage and recorded in line with it.

Building materials and fired clay (Appendix 2.1)

4.4.8 A total of 428 fragments of ceramic building material, weighing 97.48 kg, was recovered during the evaluation. All of this material is Roman in date and the majority was recovered from 3820TT (Zone 2) and 3807TT (Zone 4) (figure 15). The material was in a good condition, with two complete *imbrex* tiles and a number of substantial *tegula*, *imbrex* and flat tile fragments.

4.4.9 Although a relatively small quantity of material was recovered the assemblage adds significantly to the material recovered during previous investigations at the site, and suggests the presence of buildings 150m to the west of the main villa complex. The range of material provides details on the type of structures on site, such as the presence of *tesserae* and box-flue tile. Further work would need to incorporate all the material recovered during the various stages of fieldwork at the site.

Palaeolithic worked flint (Appendix 3.1)

4.4.10 In total of 16 Palaeolithic flint artefacts were recovered (See Appendix 3.1) from Pleistocene deposits, two from Zone 1, 13 from Zone 2 and one from Zone 3.

4.4.11 The only Palaeolithic flint artefacts found in Zone 1 (Valley-side north) were two undiagnostic waste flakes from the solifluction gravels in 3783TT. These are abraded and are very probably derived.

4.4.12 In Zone 2 (Valley-side South), flint artefacts (including Levallois flakes, a crude Levallois core and a typical large blade) were reasonably abundant in flint and chalk gravel seams (probably of colluvial/solifluction origin, but possibly fluvial in the case of the flint gravel in 3805TT) in 3805TT, 3829ATT and 3829BTT, and also present in the Late Pleistocene fluvial flint gravel in 3808TT (figure 4). These artefacts are probably a little disturbed from their original depositional location in light of their abraded condition. Undiagnostic waste flakes were also found in the fluvial gravels in 3806TT and 3807TT. These were also abraded, and were probably derived from the colluvial/solifluction deposits into which the fluvial gravels were cut.

4.4.13 In Zone 3 (Valley bottom), a single Palaeolithic waste flake was found in Late Pleistocene fluvial flint gravel overlying flint/chalk gravel solifluction deposits in 3828TT, probably an equivalent deposit to the fluvial artefact-bearing gravel in 3806TT and 3807TT.

4.4.14 No Palaeolithic artefacts were found in any of the Pleistocene sediments in Zone 4 (Gravel spur).

Later prehistoric worked flint (Appendix 3.1)

4.4.15 A total of 385 flints and 718 pieces of burnt unworked flint (weighing 11,590 Kg) were recovered from later prehistoric contexts. The assemblage included a small number of late Mesolithic and Early Neolithic flints, but was dominated by middle

Neolithic to early Bronze Age material. Several trenches also produced flint that on technological ground belongs to the middle to late Bronze Age.

4.4.16 A minor concentration of flints was recovered from Trenches 3795TT, 3797TT and 3799TT. In general, the flint from these trenches appeared Neolithic, although some Bronze Age material was present. The condition was exceptionally variable and heavily rolled pieces were common, suggesting that the majority of this group were not *in situ*. A second distinct concentration of lithics is present to the east of the site in Trenches 3833TT to 3836TT, accounting for over 50% of the assemblage (219 flints). Whilst the condition of the flint from 3833TT indicates that it is most probably residual, 3834TT and 3835TT contain assemblages with a high proportion of apparently well stratified, possibly *in situ* material. In particular the flint in Trench 3836TT is in fresh condition and occurs in chronologically distinct layers, such that middle to late Neolithic flintwork in deposit 3836015 is overlain by Late Neolithic to early Bronze Age flint work in 3836013 (figure 14).

4.4.17 It is apparent from the distribution of flints over the majority of the site (figure 16), that there is considerable potential for the recovery of significant flint assemblages, and *in situ* assemblages should be anticipated in localised areas. The highest potential appears to lie at the eastern extremity of the gravel spur, immediately adjacent to the present channel of the River Ebbsfleet. The deposits in Trench 3836TT may prove to be of considerable significance, particularly given their proximity to nationally important Neolithic sites. The artefact scatter found in 3836TT was located within in a sequence of colluvial deposits slumping down towards the bank of the Ebbsfleet. Although no direct stratigraphic correlation can be made with the nearest in situ finds of Ebbsfleet Ware (the pottery of this type found in the STDR4 evaluation was located on the opposite side of the river) the riverbank location is typical of Neolithic finds from the valley.. The sequence of deposits 3836013 to 3836015 contained stratified flintwork spanning the middle Neolithic to Early Bronze Age. Zone 3 (the valley bottom) may also produce considerable numbers of flints although the majority may prove residual.

Metalwork (Appendix 4.1)

4.4.18 The assemblage comprises 20 objects, comprising two copper alloy, one possibly of lead and iron and 17 iron objects. The iron objects include 11timber nails. Although only the Fibula is intrinsically datable to the Roman period, the remaining metal finds derive from the area of Northfleet Roman Villa (3820TT, 3830TT) or Trench 3807TT, both of which show evidence for intensive Roman activity. Most, if not all of the material is therefore likely to be of Roman date. Apart from the brooch the material has little potential for further analysis, although the assemblage should be retained and reassessed in the light of future fieldwork results.

Metal-working residues (Appendix 4.2)

4.4.19 Two small slag fragments have been recovered by hand excavation from 3806TT and 3834TT. They both appear to be iron slag.

Worked wood (Appendix 5.1)

4.4.20 Woven roundwood structure in Trench 3815TT: Trench 3815TT (figure 8) contained a discreet spread of roundwood located in the top of the peat, associated with 5 very small, flint-tempered pottery sherds of probable Bronze Age date. The structure is radiocarbon dated to 1690 - 1520 cal BC at 68.2% probability. The southern edge of the spread was fairly clearly defined and orientated on a more or

less straight east-west line. Several small poles lay towards the eastern end, apparently crossing over each other at right angles. Initially it was unclear whether the roundwood formed a natural accumulation or was a disturbed man-made structure. Further cleaning and excavation of the southern edge suggested that it may have been the very bottom of a linear wattle-work line, with much of the wood to the north being collapsed elements of some form of upstanding woven roundwood structure, possibly a fence or fish trap wall.

4.4.21 Plank revetment in Trench 3818TT: Trench 3818TT (figures 9) contained part of a lightweight plank revetment and other fragments of worked wood, found in association with Roman artefacts and located c.30m north of Northfleet Roman Villa. A possible land surface could be seen in section on the north side of the revetment, suggesting that the structure may have revetted a Roman period channel located immediately north of the villa buildings. The east-west alignment of the plank revetment is similar to the villa complex. The revetment was a simple, low structure comprising two cleft oak stakes, with a tangentially faced, almost certainly sawn, oak plank set on edge behind them. The oak plank appears to have been split along the pith line and was probably originally almost twice as wide. However, as the stakes are widely spread and relatively modest in size it is unlikely that the structure ever stood more than two planks high (c.0.9m).

4.4.22 Other worked wood in Trench 3818TT: A sparse, amorphous deposit of small roundwood, including some worked fragments of larger timber, was present at the south-western end of Trench 3818TT in a peaty silt matrix (figure 9). Cut ends could be seen on some of the roundwood, and at least one large oak chip was visible. The most interesting piece was a battered fragment from a square hewn pole of a deciduous wood (species uncertain - possibly alder). The object was c. 0.4m long and 0.08m thick. Most of the surface had been cut away from a sawn cut, reducing its thickness. The recessed area was pierced by three evenly spaced pegs c. 0.03m in diameter and was stained by contact with a small iron object. The function of the object is quite unclear as pegs are not known at all from Roman structural woodwork in London, but they are known in Roman joinery, boat timbers, machinery and a variety of other objects. The object is slightly reminiscent of the cage frame found in the fort ditch of Roman Carlisle but is rather larger. Located between the south facing revetment described above and the edge of the gravel spur on which the villa is constructed, the wood is likely to be part of an accumulation of Roman period occupation debris.

Miscellaneous artefacts (Appendix 6.1)

4.4.23 A total of 40 shells, one fragment of wall plaster, four fragments of floor plaster, 13 stone fragments and one sherd of glass were recovered by hand excavation. They have been briefly scanned in order to establish their identification and potential. The only artefact classes of any interest are the Roman building materials (wall and floor plaster and stone) which, although not *in situ*, provide some evidence for the character of the villa complex.

4.5 Environmental evidence

Pleistocene small vertebrates

4.5.1 In Zones 1 and 2 (Valley-side South and North), analysis of bulk sediment samples from deposits in 3782TT, 3787TT, 3789TT and 3790TT (Zone 1), and 3805TT, 3807TT, 3808TT and 3829ATT (Zone 2), did not produce any small vertebrate evidence. A single tiny fragment of the spongy interior of a large vertebrate bone

was present in sample 29 from the top of context 3790003 in 3790 TT; this was completely unidentifiable, but does however indicate the potential of the deposit to contain identifiable mammalian remains.

4.5.2 No large vertebrate remains were found, and no Pleistocene sediments suitable for the preservation of small vertebrate material were encountered in Zone 3 (Valley-bottom).

4.5.3 In Zone 4 (Gravel spur), small vertebrate molars and incisors (rodent, including possibly lemming) were present in the Late Pleistocene colluvial/solifluction deposits (sands) that constituted the majority of the sequence in 3834TT and 3835TT. These were reasonably well-preserved although moderately scarce in sample 107/108 from the middle of the sands (3835008) in 3835TT, and scarce and moderately poorly preserved in sample 59 from the very base of the sands (3834003) in 3834TT. No evidence was found of larger vertebrates.

Later prehistoric and Roman animal bone (Appendix 7.1)

4.5.4 A total of 125 (9057g) fragments of bone were recovered by hand from the site. From this number, 76 (8107g) fragments were identified to species (just over 60% of the total number of fragments recovered). Over 95% the bone from the site was in very good condition with very few new breaks as a result of excavation. None of the bones had evidence of burning or tooth gnaw marks.

4.5.5 The majority of the bone came from Roman contexts in Zones 2 and 4 (3807TT, 3820TT and 3834TT) (figure 16). Only seven fragments of identified bone were assigned to possible prehistoric deposits. These included a horse mandible and radius and a cattle scapula and tibia from context 3793006 as well as a cattle rib from context 3814004, a domestic fowl tarsometatarsus with spur from context 3815013 and another cattle rib with seven clear knife marks from context 3815015.

4.5.6 The assemblage is too small to contribute significantly to the fieldwork aims. However, when combined with material from previous and future investigations, the assemblage will provide useful additional information. The good condition of the bone indicates high potential for the recovery of well-preserved material, but larger scale excavation is required to recover an assemblage large enough for analytical purposes.

4.5.7 In Zone 3, small vertebrate material (probably amphibian, although pending full identification) was present in bulk sample 18 from the alluvial clay-silt (3795006) in 3795TT.

Pleistocene plant remains and insects

4.5.8 No plant macro-fossil or insect evidence was seen in any of the Pleistocene sediments across the site.

Molluscs

4.5.9 Pleistocene: Fine-grained Pleistocene deposits, probably of fluvial origin, containing both freshwater and terrestrial molluscs are present in Zone 1 (North Valley-side) in 3787TT, 3789TT and 3790TT.

4.5.10 No molluscan evidence was found in the Pleistocene sediments of Zone 2 (South Valley Side) or Zone 3 (Valley Bottom).

4.5.11 In Zone 4 (Gravel Spur), Molluscs, including fairly frequent *Pupilla muscorum*, were present in deposits probably of colluvial/solifluction origin in 3830TT, 3833TT, 3834TT and 3835TT.

4.5.12 Full interpretation of the nature of the sediments containing molluscs, their date of formation, and the environment and climate accompanying their deposition can only be made after further analysis and amino acid dating of the molluscs.

4.5.13 Holocene: The presence/ absence of molluscs was noted during assessment of Holocene samples for insects.

4.5.14 In Zone 1 (Valley-side N), molluscs were present at the base of the Holocene colluvium in 3787TT, and in the Holocene alluvial sequence in 3785TT.

4.5.15 In Zone 2 (Valley-side S), no molluscs were seen in any of the superficial colluvial sediments which constitute the Holocene deposition in this part of the site.

4.5.16 Molluscs were abundant throughout the Holocene fluvial and alluvial sediments and peats in Zone 3 (Valley-bottom). Shells of the aquatic molluscs *Lymnaea palustris* and *Gyraulus albus* were noted in Sample 185, Trench 3815TT, Context 3815003.

4.5.17 In Zone 4 (Gravel spur), no molluscs were seen in any of the superficial colluvial sediments that constitute the Holocene deposition in this part of the site.

Holocene insects (Appendix 8.1)

4.5.18 The assessment of insects is based on two sequences through the general alluvial and peat sequences (Trenches 3809TT and 3815TT) and one sequence through the deposits in the area of Roman activity (Trench 3818TT).

4.5.19 The only sample with potential for further analysis is Sample 139 from Trench 3809TT, Context 3809011. The poor preservation and low concentration of insects in the other samples which contain insect remains render them unsuitable for detailed analysis. The insects in Sample 139 have the potential to provide much information on the woodland in the valley bottom when it was becoming waterlogged, including whether or not an "old woodland" fauna was present.

Holocene charred and waterlogged plant remains (Appendix 9.1)

4.5.20 Three Holocene alluvial sequences were examined to assess the potential of the waterlogged plant remains to address the Fieldwork Event Aims. The sequences were selected because they can be directly related to archaeological remains, and because they are thought to be representative of the Holocene open channel and marsh sequences recorded in the valley bottom.

4.5.21 The macroscopic plant remains provide some evidence to characterise the sediments from which the sample sequences were taken. The lower deposit from Trench 3809TT (3809011) is characteristic of oak woodland leaf litter with encroaching wet or marshy ground. This suggests that early Holocene, possibly Neolithic, oak woodland, and hence dry ground, was present in the area, and was swamped by a rising water table. This in turn raises the potential for early Holocene archaeology below the peats. The sequence sampled from Trench 3815TT produced a flora more characteristic of shallow nutrient rich muddy water or marshes. There is no evidence for a phase of alder fen in any of the trenches.

4.5.22 Sample 197 from context 3818039 produced evidence of cereal processing waste, in the form of spelt wheat glume bases, associated with the Roman archaeological

evidence recovered during the evaluation from Trench 3818TT. Spelt wheat is the typical wheat of the Roman period. The waterlogged seeds in this sample include species probably growing within the settlement (*Urtica dioica*).

Holocene pollen (Appendix 10.1)

4.5.23 Forty-four samples from five monoliths, 126, 174, 175, 203-1 and 203-2 were made available for palynological sampling and assessment. Most of the samples counted save for those in made ground, oxidized mineral layers and dry, desiccated peat contained often abundant and generally well preserved pollen. Broad scale environmental changes can already be identified, such as the environmental changes associated with rising groundwater in Monolith 203-1 and all monoliths save M175 from the ?Roman channel contained evidence of possible cereal cultivation.

SECTION 2: STATEMENT OF IMPORTANCE

5. CONCLUSIONS

5.1 Extent of archaeological deposits

5.1.1 Table 5 summarises the distribution of geological/ archaeological evidence between the four zones. The distribution of finds is shown on figure 16. Areas of principal Palaeolithic, later prehistoric and Roman archaeological potential are identified on figures 17-19.

Table 5: Summary of geological/ archaeological evidence by zone.

	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**
	North Valley Side	**South Valley Side**	**Valley Bottom**	**Gravel Spur (Northfleet Villa)**
Geological evidence	Pleistocene (fluvial, solifluction and colluvial), overlain by Holocene (colluvial, and fringe of Holocene alluvium). This is a key area for recording relationships between the major Pleistocene stratigraphic units characterised by environmental evidence from ARC ZR400 and BH 0021.	Pleistocene deposits, generally colluvial and solifluction, interspersed with fluvial events, below Holocene colluvium. Possible continuation of archaeologically rich Pleistocene sequences recorded in Bakers Hole SSSI (especially 3805TT, 3808TT).	Holocene waterlain sediments occur in 3793TT, 3794TT, 3795TT, 3796TT, 3797TT, 3799TT, 3800TT, 3809TT, 3810TT, 3812TT, 3813TT, 3814TT, 3815TT, 3816TT, 3817TT, 3818TT, 3828TT and typically consist of bedded clay-silt and thin peat units overlying a major wood/reed peat at depth. Pleistocene high energy braided channel gravel deposits. encountered at depth.	Thin Holocene colluvial or floodplain horizons overlying late/ final Pleistocene colluvium/ solifluction deposits.
Pleistocene environmental evidence	Localised Pleistocene deposits are rich in environmental indicators (eg BH 0021). A single unidentified fragment was found in the present evaluation in 3790TT	No Pleistocene deposits produced environmental indicators but rich deposits are known to exist in the vicinity	None	Small vertebrate teeth present in late Pleistocene colluvial/ solifluction deposits in 3834TT and 3835TT
Pleistocene (Palaeolithic) archaeological evidence	A few derived Palaeolithic flint artefacts were found in solifluction gravels in 3783TT	*In situ* or slightly reworked Palaeolithic artefacts in unquarried areas of Zone 2. (3805TT, 3808TT)	None	None
Holocene environmental evidence	None	None	Waterlogged alluvial sequence with rich environmental evidence, particularly from peat units. Trenches assessed were 3809TT, 3815TT	Rich deposits also noted in 3795TT. Some potential for deposits adjacent to River Ebbsfleet in vicinity of 3836TT and 3834TT.

	Zone 1	Zone 2	Zone 3	Zone 4
	North Valley Side	**South Valley Side**	**Valley Bottom**	**Gravel Spur (Northfleet Villa)**
			and 3818TT.	
Holocene (prehistoric) archaeological evidence	Very sparse NEO/ BA flint, pottery and one undated feature in Holocene colluvial sequence	Small quantities of flint artefacts residual in colluvium and Roman features.	Occasional later prehistoric features, particularly in the south of the zone including a cobbled platform (3812TT) and a waterlogged horizontal wattle panel (3815TT). Very few artefacts. C14 dates from peat and wattle structure in 3815TT are MBA.	High density of *in situ* or slightly reworked flint and pottery (including one Ebbsfleet Ware sherd) in possible soil horizon adjacent to the River Ebbsfleet (3836TT).
Holocene (Romano-British) archaeological evidence	None	Intense localised Roman activity on edge of alluvial basin. High concentrations of features, pottery and building material in 3807TT. Probably a building in the near vicinity. However, adjacent trenches are empty except for a RB cremation in 3806TT.	Waterlogged Roman worked wooden structures and artefacts in trenches adjacent to Northfleet Villa in 3818TT. Evidence for insubstantial plank revetment of a former channel of the Ebbsfleet (artificial?). Waterlogged crop-processing waste.	Northfleet Roman Villa complex. Wall footings, well, cobble surfaces, boundary ditches. Generally truncated by stone-robbing, previous excavations etc. Localised survival of more complex stratigraphy in and around 3831TT. Complex of features in 3834TT may be landscaping of the River Ebbsfleet bank.
Holocene (Anglo-Saxon) archaeological evidence	None	None	None	2 sherds of Anglo-Saxon pottery from 3833TT add to slight indications for Anglo-Saxon activity in the vicinity of the villa.

5.2 Date and character of archaeological deposits

Zone 1 North Valley Side

5.2.1 Zone 1 Palaeolithic/ Pleistocene overview: A complex suite of Pleistocene deposits was present whose nature and full stratigraphic inter-relationships cannot be established from current information. Generally the deposits were dominated by coarse basal soliflucted facies overlain by fluvial and subsequent finer colluvial sediments. Fluvial sediments occur at two main levels, between 4m and 6m OD, and between –2m and 1m OD. The higher set may correspond to the Penultimate Interglacial complex of sediments known from previous work in this part of the site by the British Museum (Kerney & Sieveking 1977), Wenban-Smith (1995) and for Pylon ZR4 (URN 2000). The lower set probably correspond to the last Interglacial complex previously identified in Borehole 0021 SA (URL 1997). Both sets of fluvial deposits are overlain, and truncated, by thick bodies of subsequent colluvial deposits, which dip and thicken downslope to the southeast. The overlying colluvial

sediments in 3782TT and 3784TT were broadly correlated with the similar sequence at the ZR4 pylon site.

5.2.2 Zone 1 Holocene overview: Deposits of this period in Zone 1 are mainly represented by colluvial slope wash deposits overlying similar Pleistocene deposits and thickening down-slope to the east. A deep alluvial sequence was also present in 3785TT, demonstrating incursion of the NE margin of the outer freshwater Holocene basin into this site zone.

5.2.3 There was very little evidence for human activity in this zone. A small pit/posthole type feature was found within the Holocene colluvium in 3789TT, lacking dating evidence but probably late prehistoric or Romano-British period judging from evidence of contemporary activity. Occasional lithic artefacts, fire-cracked flint and a piece of late prehistoric pot (Neolithic/ Bronze Age?) were found in the Holocene colluvium and lithic artefacts were found in the top part of the alluvial sequence in 3785TT.

Zone 2 - South Valley Side

5.2.4 Zone 2 Palaeolithic/ Pleistocene overview: This zone is dominated by Late Middle Pleistocene colluvial and solifluction deposits (Chalk and flint diamict overlain by laminated sands with occasional gravel trails and patches, possibly representing short-lived fluvial events) filling a dry valley trending SW–NE (3829A-B TT, 3805 TT). These colluvial, solifluction and possible fluvial deposits correspond in part to some of those previously investigated by Smith and Burchell, which produced Levalloisian archaeological evidence in association with faunal remains. This group of deposits is truncated and abutted to the NE (3806-8 TT), towards Zone 3 (Valley-bottom) by a fining-up Late Pleistocene fluvial gravel–floodplain clay-silt sequence whose base deepens into the valley-bottom from c. 1m OD in 3808 TT to c. –0.5m OD in 3806 TT. These fluvial deposits are overlain by colluvial deposits which are predominantly Holocene, but may also include Late Pleistocene colluvial/aeolian sediments.

5.2.5 The remnant tram-track found crossing 3805TT and 3808TT corresponds to that in whose cutting Spurrell (1883) discovered the first Palaeolithic archaeological remains in the Ebbsfleet Valley, further along it to the west.

5.2.6 Zone 2 Holocene overview: Holocene sediments consist of colluvial and plough zone deposits, and possibly some Roman ground-levelling layers in 3807TT.

5.2.7 Later prehistoric evidence is limited to residual worked flint from colluvial and plough zone deposits, and from the fills of Romano-British features.

5.2.8 There was considerable evidence for Romano-British activity concentrated on the edge of the alluvial basin in this zone (Trench 3807TT, figure 5). A cremation urn, of late Iron Age or Romano-British date, was found within the bottom part of the Holocene colluvium in 3806TT (3806006). There was much Romano-British activity in 3807TT, with several intercutting ditches and other features containing large quantities of Roman building debris including large limestone blocks and abundant tile and brick, possibly representing debris from a building in the near vicinity and/ or ground levelling above the margin of the alluvial basin.

5.2.9 The terraced football pitch was shown to have 20th century made ground overlying truncated Pleistocene solifluction deposits. The truncated surface sloped shallowly down from the southern edge (3829ATT) to reach a depth of 4.30m, 12m in from the edge (3803TT).

Zone 3 - Valley Bottom

5.2.10 Zone 3 Pleistocene overview: Pleistocene deposits, typically comprising gravels characteristic of a high energy braided channel environment, were recorded in many of the trenches in this zone (3794TT, 3795TT, 3796TT, 3797TT, 3800TT, 3811TT, 3810TT, 3812TT, 3817TT, 3818TT, 3819TT). Towards the valley side these fluvial deposits truncate and abut colluvial/ solifluction deposits. Although the relationship between the Pleistocene valley side slope wash deposits and valley bottom fluvial deposits was not encountered directly in any of the trenches, Pleistocene colluvium/ solifluction deposits were encountered in trench 3817TT on the edge of Zone 3 and dominate the Pleistocene sequence in adjacent areas of Zone 2.

5.2.11 Zone 3 Holocene overview: Holocene waterlain sediments occur in a number of trenches (3793TT /3794TT /3795TT /3796TT /3797TT /3799TT /3800TT /3809TT /3810TT /3812TT /3813TT /3814TT /3815TT /3816TT /3817TT /3818TT /3828TT) and typically consist of bedded clay-silt and thin peat units overlying a major wood/reed peat at depth. The major wood peat thins and disappears against the rising gravel surface towards the west. Towards the eastern limits of the route corridor the wood peat may rest on older sequence of clay-silts. These observations reinforce conclusions drawn from previous works, in particular the Ebbsfleet Rise works (EBB 97). Colluvial sediments of Holocene date exist in a limited number of trenches (3797TT /3817TT/ 3828TT/ 3836TT/ 3837TT).

5.2.12 Later prehistoric (Neolithic/ Bronze Age) archaeological artefacts and features have been recovered from a number of trenches and may be associated with the main wood peat. Remains of a wattle structure (3815TT) and a cobbled surface (3812TT) have been recovered in association with the upper surface of the wood peat complex (radiocarbon dated in 3815TT to the middle Bronze Age). The Holocene alluvium has previously only been considered to exist on the eastern side of the old road in front of the sports pavilion. A number of trenches to the west of the track now clearly demonstrate that thick sequences of alluvium extend into the area of the main route corridor (3793TT/ 3794TT/ 3795TT/ 3796TT/ 3797TT/ 3799TT/ 3800TT).

5.2.13 Complex sequences of aquatic sediments have been located immediately adjacent to the dry ground spur on which the Roman Villa building was constructed (3818TT/ 3819TT). These deposits consist of potential dry ground soil horizons adjacent to areas of apparent channel with evidence for Roman period artificial revetment (3818TT). This complex of features may represent the position of a river channel during the later Prehistoric and Roman period. The close proximity of the Roman building to the channel edge offers excellent potential for the discovery of waterlogged structures and occupation debris associated with the villa.

5.2.14 The slope-wash colluvium contains well-preserved palaeosols in one of the trenches (3797TT). Unfortunately no location excavated has revealed the relationship between the colluvium and buried soils and the alluvial sequences (this relationship was obscured by the presence of a large post-medieval ditch in the boundary area in 3797TT).

5.2.15 A complex sequence of thick sand bodies exist at a number of locations in proximity to the edge of the Holocene alluvium (3819TT/ 3828TT/ 3835TT/ 3836TT/ 3837TT). Neither the age nor mechanisms of deposition of these sands are currently understood. They are however extensively developed and potentially of some importance for understanding the evolution of the landscape.

Zone 4 - The Gravel Spur (Northfleet Villa)

5.2.16 Zone 4 Palaeolithic/ Pleistocene overview: The main deposits are deep colluvial/solifluction deposits (laminated sands and silty sands, with occasional chalk and flint gravel horizons), overlying probable fluvial gravels. No Palaeolithic artefacts were found in any of the Pleistocene sediments in Zone 4 (Gravel spur). Rodent molars and incisors were recovered from late Pleistocene deposits in 3834TT and 3835TT.

5.2.17 Zone 4 Holocene overview:

5.2.18 The main Holocene deposits are thin colluvial or floodplain horizons overlying Pleistocene colluvium/ solifluction deposits.

5.2.19 A dense Neolithic/ Bronze Age flint scatter in Trench 3836TT may represent material redeposited in colluvium, but the good condition of the material, and the fact that it occurs in chronologically distinct horizons, suggests that it has not been reworked to any great extent. The assemblage contains refits and many pieces have signs of usewear. There is also prehistoric material, including an irregular gully, in Trench 3834TT. Generally there is little other evidence of prehistoric activity on the gravel spur, other than residual late prehistoric flint artefacts and fire-cracked flint, disturbed by Roman occupation and post-Roman ploughing.

5.2.20 Evidence for Roman activity in Zone 4 is abundant but the Roman levels are much disturbed by robbing for building stone and extensive previous archaeological investigations. Trench 3820TT contained a Roman stone-lined well, a wall footing, a possible courtyard surface and Roman made ground, probably evidence that the natural slope of the gravel terrace was levelled prior to construction of the villa. In the area of Trench 3832TT several small trenches were opened to locate 1970's excavation areas. The largest identified a series of Roman wall lines marked on the 1913 villa plan and an associated pit. The wall footings were severely truncated, with at most only a foundation layer of cobbles surviving. Further Roman features, mainly boundary or drainage ditches, were found in trenches 3833TT, 3834TT, 3835TT and 3836TT.

5.2.21 The structural remains in 3831TT are the remains of the probable bathhouse investigated during the TAG excavations of 1977-84. The 'bathhouse' trench appears to be the only area in Zone 1 with significant potential for surviving complex Roman stratigraphy. Although much of this was removed in the course of the TAG excavations, there are substantial masonry remains and indications of intact stratigraphic sequences (although the latter appear very localised and may be restricted to baulks retained during the 1977-84 excavations). The good preservation of these remains in the north-east corner of the gravel spur may result from the fact that they are built at a slightly lower level than the rest of the building complex, on the very edge of the alluvial deposits. They may have been protected from stone robbing by a build-up of alluvial deposits, or levelling layers of Roman made ground, although this cannot be demonstrated on present evidence as the original overlying material has been largely removed by previous investigations.

5.2.22 Two sherds of Anglo-Saxon pottery from Trench 3833TT add to slight evidence from the Phase I evaluation for possible Anglo-Saxon use of the villa site.

5.3 Periods represented

Table 6: Main periods represented in each zone (excluding residual artefacts)

	Zone 1	**Zone 2**	**Zone 3**	**Zone 4**
	North Valley Side	South Valley Side	Valley Bottom	Gravel Spur (Northfleet Villa)
Palaeolithic	-	3805TT 3806TT 3808TT 3829ATT 3829BTT	-	-
Neolithic/ Bronze Age	-	-	3795TT 3797TT 3799TT	3834TT 3836TT
Middle Bronze Age	-	-	3815TT 3812TT?	
LIA/ Romano-British	-	3806TT 3807TT	3837TT 3828TT 3818TT 3819TT	3820TT 3830TT 3831TT 3832TT 3833TT 3834TT 3835TT 3836TT
Anglo-Saxon	-	-	-	3833TT
Medieval	-	-	-	-
Post-medieval	-	-	3797TT	-

5.4 Rarity

Palaeolithic

5.4.1 Pleistocene sediments of fluvial origin, as recorded in Zone 1 (ARC EFT97 Area 8) are common in southern England. However, the sequence is unusually complete for the Ebbsfleet area, where quarrying has often removed or obscured key relationships. This area therefore offers an opportunity to record the relationships between the major Pleistocene and Holocene stratigraphic units filling the valley.

5.4.2 Solifluction deposits containing near *in situ* Palaeolithic material, as recorded in Zone 2 (adjacent to ARC EFT97 Areas 5 and 6) are rare.

Later Prehistoric

5.4.3 The evidence suggests the presence of undisturbed wetland Neolithic/ Bronze Age deposits within Zone 3 (the Valley Bottom) and on the margins of the present Ebbsfleet channel in Zone 4, with waterlogged organic materials preserved in association with artefactual material. Extensive deposits of this type have not often been investigated in Southern England, except in the East Anglian Fens and Somerset Levels. Recent work in the Lower Thames Valley suggests that such sequences may be commoner than is reflected in published literature.

Roman

5.4.4 A total of 38 sites described as villas are known from Kent. Most of the excavations carried out on these sites took place in the nineteenth and early twentieth centuries and were inadequately excavated and recorded. Indeed of the roughly 20 sites which have been investigated, only eight have been published since 1950 (Champion and Overy 1989, 44). Although the major buildings at Northfleet have been heavily disturbed by quarrying and earlier archaeological investigations, there are localised areas in which complex stratigraphic sequences survive, which may allow a reliable site chronology to be constructed. There are hints of a possible further building located on the edge of the alluvial basin c. 150m west of the main complex, in the vicinity of Trench 3807TT, providing a comparatively rare opportunity to examine elements of the villa estate beyond the main building complex. Northfleet Villa is a particularly important site for placing the nearby Roman small town at Springhead in a wider landscape context. The riverside location of the villa is unusual and potentially of great importance, both in terms of potential for the recovery of waterlogged remains in direct association with the villa, and in terms of understanding the economic and social functions of the settlement.

5.5 Survival, fragility and vulnerability

General

5.5.1 Survival of the archaeological deposits will depend in part on the intrinsic fragility of the remains and in part on the impact from construction of the CTRL, North Kent Line and the International Station. While many of the Holocene and Pleistocene deposits in the Ebbsfleet Valley have been quarried away in the course of the last century, there is little evidence for such truncation in the area of the present evaluation. Over much of the area, in fact, the dumping of quarry and other waste, has buried the original ground surface, thereby protecting it from disturbance.

Zone 1 - North Valley Side

5.5.2 Although none of the deposits encountered in Zone 1 are intrinsically fragile, they lie on the line of the CTRL mainline cutting and the upper part of the sequence is at risk from CTRL construction works. Most of this zone has no covering of made ground and shows no signs of having been quarried (figure 35). The archaeological material present in Zone 1 consists for the most part of redeposited artefacts, with no indication of significant concentrations for either the Palaeolithic or later prehistoric and Roman periods. Nevertheless, the geological sequence is a key one for recording the relationships between the major Pleistocene and Holocene stratigraphic units filling the valley. Removal of the upper part of the sequence will severely compromise the level of geological information obtainable from it.

Zone 2 - South Valley Side

5.5.3 Investigation of the western part of Zone 2 (figure 2 - the football pitch terrace) indicates a thickness in excess of 5m for the made ground in this area, with a strong likelihood that the Pleiostocene sequence has been truncated by quarrying. However, at the foot of the terrace, in the eastern and southern part of Zone 2, there is very little made ground and limited evidence for truncation by quarrying. The archaeological evidence in this area is both intrinsically fragile and at risk from CTRL construction works.

5.5.4 The Pleistocene deposits investigated in this area have confirmed the potential suggested by the 1997 evaluation (ARC EFT97 Area 6) and earlier investigations in terms of *in situ* Palaeolithic archaeological material. In addition, a complex Roman archaeological sequence lies less than a metre below the present ground surface in the vicinity of Trench 3807TT. The quantity of building materials present indicates that this could be the site of a previously unknown building, associated with Northfleet Villa.

Zone 3 - Valley Bottom

5.5.5 The eastern portion of the valley bottom lies within the footprint of the proposed North Kent Line embankment. The construction impact will depend on the method used to stabilise the alluvial deposits. Intrinsically fragile archaeological deposits (including brushwood and timber structures of later prehistoric date) survive at depth within the alluvial sequence of the Holocene valley. In a large part of the evaluation area, the prehistoric sediments are buried beneath 20th century industrial and quarry waste and are therefore, at present, well protected from disturbance. Towards the southern end of the valley bottom, adjacent to the Northfleet Roman Villa, the made ground is thinner and waterlogged Roman structures survive less than 1.5m below present ground level.

5.5.6 An unexpected result of the evaluation is the discovery of deep Holocene alluvial sequences in 3793TT, 3794TT, 3795TT, 3796TT, 3797TT, 3799TT and 3800TT. These relate to an inlet on the western margin of the main alluvial basin (figure 40) and indicate that the Holocene alluvium extends into the footprint of the proposed CTRL mainline cutting. This sequence produced small quantities of Neolithic/ Bronze Age pottery and flintwork and a ditch feature of probable post-medieval date (3797TT), perhaps marking the edge of the wetlands. These deposits appear to be of relatively low archaeological significance. Their survival will depend on the construction methods employed

Zone 4 - The Gravel spur (Northfleet Roman Villa)

5.5.7 Zone 4 lies within the footprint of the proposed North Kent Line embankment. Extensive evaluation on the gravel spur has shown that many traces of the Roman villa survive. However, truncation by stone-robbing, peripheral activity associated with the quarry (including the tramway cutting) and previous archaeological investigation, has severely truncated or destroyed much of the Roman Villa complex, to the extent that wall footings rarely survive beyond a base layer of cobbles, and surfaces are only visible in isolated patches. Although preservation is generally poor, full exposure of the surviving villa footings may achieve a better understanding of the overall layout of the complex. Cut features, including boundary ditches and a well, survive to variable depths and should produce sufficient artefactual evidence to allow reassessment of the chronology of the villa complex.

5.5.8 Three areas of greater potential stratigraphic complexity have been identified:

- The strip of land immediately adjacent to the present channel of the Ebbsfleet, to the west of the villa buildings, includes a sequence of prehistoric colluvial layers (Trench 3836TT), including possible buried land surfaces, containing a high density of fresh worked flints and Neolithic/ Bronze Age pottery, apparently occurring in distinct Neolithic and Bronze Age horizons (including one sherd of Ebbsfleet Ware)..

- ξ Trench 3834TT revealed a complex series of well-preserved Roman features including possible evidence for Roman period landscaping of the bank of the River Ebbsfleet. Waterlogged structures may be present in this area,.

- ξ Re-excavation of the TAG 'bathhouse' trench (3831TT) has shown that substantial remains of the wall footings survive, up to a height of c. 1m, and although the stratigraphy has been removed within the excavation areas, the retained sections and small unexcavated areas to the east and south, may preserve a more complex stratigraphic sequence than survives anywhere else on the site. This may be due to the location of the bathhouse immediately adjacent to the river bank, at a slightly lower level than the rest of the complex. The sequence in this trench is very fragile and is likely to be adversely affected by compression from the North Kent Line embankment.

5.6 Documentation

5.6.1 The Pleistocene deposits in the vicinity of Zone 2 were investigated in the early 20th century by RA Smith and others who excavated a rich Levalloisian assemblage in the vicinity of the surviving deposits (Smith 1911). This site is Britain's best, most documented and richest Levalloisian site.

5.6.2 Some work on Neolithic deposits in the valley bottom, undertaken during the 1930's by Burchell, has been published (Burchell, 1939; Burchell & Brailsford 1948). Later work by Sieveking remains to be published.

5.6.3 A brief report of the 1909-11 Northfleet Villa excavations was privately published (Steadman 1913). The site plan shows the exposed wall footings but not the extent of the excavation areas. It is clear from the text that the excavation concentrated on locating the wall footings with little investigation of the areas between. To the west of the quarry tramway the trenches simply follow the wall lines. An area in the north-western part of Zone 4 appears to have been stripped but produced no wall footings and is therefore marked 'X' on the published drawing (see figure 15), with no indication of the area stripped.

5.6.4 Of the Thameside Archaeological Group's excavations, brief interim reports have appeared in the Kent Archaeological Review (1978-84) but no other material has been published. It has not been possible to obtain any records of the excavation and the location of the primary archive remains unknown, despite extensive research to locate it.

5.6.5 Recent work undertaken for KCC on the Holocene sedimentary deposits in the valley bottom has been published (Barham and Bates 1995).

5.6.6 A two-stage evaluation of the Ebbsfleet Sports Ground site was carried out in 1997 by the OAU, on behalf of Blue Circle Industries plc (OAU 1997), comprising eleven boreholes and three test pits.

5.6.7 Evaluation trenches at the northern extent of the STDR 4 scheme did not recover any archaeological remains (MoLAS 1999). However, it is likely that the trenches were not sufficiently deep to have reached the levels at which greatest archaeological potential exists.

5.6.8 CTRL fieldwork in the immediate vicinity includes the Phase 1 evaluation, carried out in 1997, for which a fieldwork report is available (URL 1997). Excavations within the Bakers Hole SAM 267a, on the relocated site of Pylon ZR4, are

documented in a post-excavation assessment report produced by OAU for CTRL, (URN 2000).

5.6.9 An evaluation report on the STDR4 route on the east side of the valley is available (OAU, 2000). Borehole and test pit data from that project has been used in the geoarchaeological modelling carried out as part of the CTRL evaluation. Mitigation works are ongoing at the time of writing.

5.7 Group value

5.7.1 The number of locations within the Ebbsfleet Valley where documented Palaeolithic/Pleistocene research has been carried out give added value to any further research.

5.7.2 Northfleet Villa site falls within the densest concentration of villa sites in Britain. Although badly damaged, much information can be recovered from the site which will shed light on the common features and differences between this group of North Kentish villas and those in other regions.

5.7.3 Furthermore the proximity of the villa to the Roman 'small town' at Springhead may be expected to shed light on the relationship between Roman small towns and their rural hinterlands. The CTRL offers an unparalleled opportunity to re-examine Springhead and its environs, including the question of whether the Ebbsfleet was navigable as far as the town. Northfleet Villa is located close to the mouth of the river and may have been a key landing point for River traffic bound for Springhead.

5.8 Potential

5.8.1 This section reviews the success of the fieldwork in addressing the Landscape Zone Priorities and Fieldwork Event Aims and the potential for further fieldwork and analysis to provide additional information:

Landscape Zone priorities

a - Reconstruction of the changing environment of this part of the Greater Thames estuary, in terms of its geomorphology, vegetation and climate, through the implementation of a sampling strategy

5.8.2 Pleistocene sequence: Limited evidence for Pleistocene environmental change has been recovered. However, the fieldwork has highlighted areas of significant deposits and the nature of the evidence they contain.

5.8.3 Holocene sequence: The evidence recovered has not significantly altered previous perceptions of the geomorphological history of the Ebbsfleet system. However, this phase of investigation has enabled the position of the boundaries to be refined and the nature of the sedimentary sequences to be elaborated. In addition, extensive sampling of the Holocene sequence has been undertaken to allow future detailed analysis.

5.8.4 Assessment of key Holocene paleoenvironmental sequences associated with later prehistoric and Roman archaeological features has demonstrated that survival of waterlogged macroscopic plant remains and pollen is good. The plant macrofossils and insects from the lower deposits from Trench 3809TT are characteristic of oak woodland leaf litter with encroaching wet or marshy ground. This suggests that early Holocene, possibly Neolithic, oak woodland, and hence dry ground, was present in the area, and was swamped by a rising water table, possibly as result of

sea-level rise. This in turn raises the potential for early Holocene archaeology below the peats. The sequence sampled from Trench 3815TT, in association with a Bronze Age waterlogged wattle structure, produced a flora more characteristic of shallow nutrient rich muddy water or marshes. There is no evidence for a phase of alder fen in any of the trenches. Broad environmental changes are also apparent in the pollen record, although further work is required to correlate the data with other strands of evidence.

5.8.5 More detailed and extensive examination of the pollen, insects and plant macrofossils, in conjunction with geoarchaeological deposit modelling, has excellent potential for reconstruction of the changing Holocene valley landscape, sea level change, vegetation and climate.

b - Characterisation of the nature of human exploitation of the Ebbsfleet floodplain, and its margins (including the terraces and the intertidal zone), and how this changes through time

5.8.6 Pleistocene - Palaeolithic: The limited Middle Palaeolithic artefactual evidence recovered so far does not allow direct interpretation of Palaeolithic behaviour at the site. Despite the disturbed context, further fieldwork to recover a larger assemblage would help characterise local activity as the archaeological material has probably not been transported far. It would also clarify the stratigraphic relationships of the artefact-bearing deposits, which would allow investigation of cultural and behavioural changes through time.

5.8.7 The (Levalloisian) character of the technology may reflect a change in the pattern of Palaeolithic behaviour generally, from the previous Lower Palaeolithic adaptation based on handaxes and crude (Clactonian) flake-core reduction. Further investigation of larger Levalloisian archaeological assemblages from the site would help address this national objective of Palaeolithic research.

5.8.8 Holocene - Later prehistoric: The evaluation (Trenches 1812TT , 3815TT) indicates that later prehistoric human activity (although probably not settlement) occurred within the wetlands on the valley floor). The close proximity of most of the prehistoric waterlogged features and artefact scatters to the gravel spur and the gravel high is unlikely to be accidental, although little direct evidence for corresponding dry land prehistoric activity has been found. The lack of significant prehistoric evidence may be due to intensive Roman activity obscuring earlier evidence, in particular in the vicinity of 3807TT and 3818TT. The evidence from 3818TT suggests that Roman fluvial activity impacted on parts of the higher gravel surface (cut and fill sequences) and this may have led to any archaeological remains from older occupation episodes being modified or removed.

5.8.9 Holocene - Roman: Evidence for Roman period riverside activity is more extensive and the evaluation has produced direct evidence for channel management and landscaping of the riverbank. There is excellent potential for more extensive area excavation to recover waterlogged artefacts and structural remains in close association with the villa complex.

5.8.10 This aim will be most effectively addressed by further excavation extending from the dry ground into the wetlands, with sufficient open area exposed to characterise the later prehistoric and Roman dry land and wetland archaeology and the interface between them.

c - Determination of the effect of human activity upon the environment of the floodplain and its margins. Does this effect change in nature and intensity with time?

5.8.11 The value of the palaeoenvironmental evidence from the valley bottom is enhanced by its association with archaeological material in several trenches. This raises the possibility of detecting human influence on the natural landscape through exploitation of the wetlands.

5.8.12 The key sedimentological evidence for human activity influencing the floodplain and its margins is probably the colluvium on the valley sides, the majority of which is likely to be a direct result of human activity. However, the impact of colluviation and the relationship to the valley bottom sediments cannot presently be demonstrated due to the disturbance to the profiles in key locations (3807TT, 3797TT).

5.8.13 The construction of the Roman revetment in Trench 3818TT hints at management of the wetlands and riverbank, which probably influenced local drainage patterns and properties.

5.8.14 This aim will be most effectively addressed by further excavation extending from the dry ground into the wetlands. Emphasis should be placed on recording and sampling continuous stratigraphic sequences from dry ground to wetland areas.

d - Consideration of the effects of riverside exploitation and trading locations

5.8.15 The evidence of value for addressing this aim relates almost exclusively to the Roman period, and is based on the topographic location of Northfleet Villa. The geoarchaeological modelling has emphasised the strategic position of the villa in relation to the river (figure 28). The Ebbsfleet would almost certainly have been navigable to this point and could well have been an important landing point for River traffic bound for the 'small town' at Springhead. The discovery of a revetment in the wetland immediately to the north of the villa complex suggests some degree of channel management, possibly even that artificial channels or docks may be present.

5.8.16 More extensive exposure of the channel edge is required to establish the extent and nature of the Roman riverside activity.

Specific research aims

Aim 1 - Evaluate the depth and extent of made ground within the investigation area

5.8.17 Made ground has been recorded extensively throughout the study area and the thickness of made ground has been mapped. This evidence clearly shows very little made ground in the area of Pleistocene sediment accumulation in the North Valley Side (Zone 1). Very little made ground also exists between 3806TT and 3808TT in Zone 2. Elsewhere the thickness of made ground is up to 5m in the valley bottom and nearly 17m in the valley side area where previous quarrying and landfill has taken place.

5.8.18 The football pitch terrace behind the demolished sports pavilion has been confirmed as consisting of made ground to a depth of over 6m within the station/track footprint. The base of the made ground slopes up steadily at the southern edge of the terrace, and is only 1m below the current ground surface at the base of the terrace in 3829A TT.

Aim 2 - Evaluate the depth and extent of Holocene deposits within the investigation area

5.8.19 This aim has been substantially achieved, but some unanswered questions remain, in particular, the relationship between the alluvial sequence and valley margin colluvium has yet to be recorded, since it was obscured by archaeological features in trenches 3797TT and 3807TT. The observation and sampling of such sequences is of considerable significance if the relationship between the accumulation of colluvium at the foot of the slope and the natural accumulation of sediments in the wetland area is to be determined. In addition, the eastern part of the gravel spur includes significant thicknesses of probable Holocene deposits (in Trenches 3834TT, 3935TT 3936TT), but their origin, date and full depth remain to be demonstrated.

5.8.20 The major finding of this study indicates that the Holocene deposits are more extensive than previously considered. Previous investigations and the mapping of the BGS indicated that the extent of the Holocene alluvium was restricted to the area to the east of the trackway running north/south in the vicinity of the former sports ground pavilion. Excavation of trenches to the north and east of the former pavilion (3793TT, 3794TT, 3795TT, 3796TT, 3797TT, 3799TT, 3800TT) now clearly demonstrate the existence of thick sequences of Holocene sediments within these areas.

5.8.21 The thickness of the sedimentary sequences containing Holocene deposits may reach 4m in places. Elsewhere the thickness of the Holocene alluvium thins in the direction of the gravel high and the spur on which the Roman building was located.

Aim 3 - Evaluate the depth and extent of any surviving Pleistocene deposits within the investigation area

5.8.22 This aim has been generally satisfactorily accomplished, although there is still uncertainty over whether certain bodies of silty sands are of Holocene or Pleistocene origin.

5.8.23 The application of amino acid dating on molluscan evidence and OSL dating on the sediments themselves could be usefully applied to address this issue, as could the excavation of longer sections to enable the recording of key stratigraphic relationships.

Aim 4 - Establish the surviving topography of chalk bedrock within the investigation area

5.8.24 This is difficult to ascertain. The nature of the Chalk surface, particular where overlain by chalk solifluction deposits on the valley sides is difficult to locate. The badly preserved nature of the Chalk bedrock surface, prone to break-up, weathering and *in situ* wasting means that it is often difficult to recognise the boundary between the two deposits except where extensive sections are available for consultation. In the areas of the Holocene alluvium on the valley floor it has not proved possible to investigate significant depths below the base of the gravel due to unstable ground conditions. Consequently the chalk topographic surface remains poorly known. The only way to achieve this aim satisfactorily would be a closely-spaced series of boreholes.

Aim 5 - Provide a detailed graphical representation of the subsurface topography of the investigation area as derived from 1-4 above

5.8.25 At present this is only realistically possible for the gravel surface topography beneath the Holocene alluvium in the valley bottom area. Detailed investigation and correlation of Pleistocene deposits remain to be undertaken and therefore correlation and the creation of topographic surfaces related to the Pleistocene sediments cannot presently be undertaken. Figure 25 illustrates the gravel surface topography for the area of the valley bottom adjacent to the gravel high and spur.

5.8.26 Figures 26-28 illustrate the gravel surface topography and the estimated positions of the dry ground/wet ground interface during the early Neolithic, Bronze Age and the period of Roman occupation. These projections are based on time/depth estimates for onset of organic sedimentation onto gravel surfaces in the lower Thames as previously calculated by Bates (1997). The projections show the gradual expansion of the wetland zone and the loss of dry ground habitats.

Aim 6 - Relate the findings of the evaluation to the results of previous archaeological work in the valley commissioned by URL or others

5.8.27 Pleistocene: The Pleistocene sediments identified in Zones 1 and 2 can be tentatively related to those known from previous investigations. In Zone 1 (North Valley Side), fluvial deposits probably relating to the Penultimate Interglacial Complex previously investigated at the site (Kerney & Sieveking 1977; Wenban-Smith 1995; RLE 2000) were identified, as well as fluvial deposits probably relating to the Last Interglacial Complex present in Borehole 0021 SA (URL 1997) (the log for Borehole 0021SA is reproduced in this report for comparison as figure 30). Colluvial and solifluction deposits of uncertain age were also present.

5.8.28 The palaeo-environmental (molluscan) evidence in three of the Zone 1 test pits may help in dating certain sediments sufficiently precisely to establish more secure correlations/relationships between units identified during the investigation and those known from previous investigations. Generally, the test-pits dug did not allow a sufficient view of the geometry of the Pleistocene deposits discovered to interpret their nature fully, or to establish their stratigraphic relationships with those from other test pits and with sedimentary units known from the records of previous investigations. Having identified the locations of relevant sediments, to address these aims requires the exposure of longer sections, and (hopefully) the discovery of further sediments with palaeo-environmental or biological evidence of use for dating.

5.8.29 In Zone 2 (South Valley Side), the colluvial and solifluction deposits found can be broadly correlated with those previously investigated in this part of the site by Spurrell, Smith and Burchell. The Chalk solifluction gravels at the base of 3808TT, 3805TT, 3839ATT and 3839BTT may correspond to the Baker's Hole Coombe Rock investigated by Smith. The Chalky gravels higher up the sequence in 3829A TT probably represent secondary derivation of material from Smith's Coombe Rock, but may alternatively be a direct continuation of it. The sequence in 3805TT looks very similar to that recorded by Burchell at his Site B, in the centre of his presumed "Ebbsfleet Channel", where his Levalloisian floors were found in a thin gravel band with "loam" above and below it (figure 29), which may correspond to the gravel band containing a Levalloisian blade in 3805TT. The location of Burchell's Site B is unknown, but was probably 50-100m to the south-west of 3805TT.

5.8.30 In the absence of any biological evidence, correlations are not possible without more information on the geometry of the deposits, which could be achieved by opening up longer sections transecting Zone 2, and linking it with the key area to the south (Area 6) where parts of Smith's site are preserved. It should be noted that Burchell's Levalloisian horizon produced faunal remains, so such evidence may be present in other parts of the deposit.

5.8.31 Holocene: The main Holocene alluvial sequences found across much of the site area where sedimentation was predominantly vertical (e.g. 3809TT, 3810TT, 3811TT, 3812TT, 3813TT) are typical of many locations in the main valley area and are therefore of relatively low significance. However it should be remembered that, although these sediments are replicated at a number of sites, no previous work has fully investigated any of these typical sequences. The present evaluation has in most respects confirmed the results of the Northfleet Rise revaluation (OAU 1997). More significance is however placed on the valley edge sequences where alluvial sequences are to be found in close proximity to valley marginal colluvial sequences (as well as archaeological features). This relationship has never previously been examined in detail and although the contact between the sequences were disturbed when seen in 3797TT the evidence from this and other trenches suggests that well preserved edge marginal sequences are likely to exist in this area. The observation, recording, and sampling of such sequences is of considerable significance if the relationship between the accumulation of colluvium at the foot of the slope and the natural accumulation of sediments in the wetland area is to be determined.

5.8.32 Other significant sequences not previously observed relate to the cut and fill sequences associated with the Roman archaeological activity in the vicinity of 3818TT. Until the recent works on the STDR-4 route corridor no minerogenic cut and fill sequences, probably indicative of the position of a former channel of the Ebbsfleet, had been observed. The presence of the sequences in 3818TT suggest that this area represents one of open channel during the Roman period and is therefore of some considerable significance.

Holocene Valley sedimentation

Aim 7 - Assess the palaeoenvironmental significance and archaeological potential of any colluvial, alluvial (marine/ peat horizons), marsh and channel margin Holocene deposits that may be preserved on the site

5.8.33 See 5.8.4 above.

Aim 8 - Correlate the Holocene sequence revealed with the results of previous investigations in the Ebbsfleet Valley in particular Northfleet Rise (OAU 1997 EFT97) and the Phase I CTRL evaluation (URL 1997 - ARC EFT97)

5.8.34 The sequences observed during the recent works correlate well with previous works undertaken in the vicinity. In both the EBBS 97 and URL 97 works evidence suggested that the alluvial sequences wedged out towards the valley side in the vicinity of a gravel high. This has been demonstrated (see Figures 26 and 27). This area was previously highlighted as one of likely archaeological significance and it is therefore unsurprising that a number of prehistoric (probably middle Bronze Age) features were found adjacent to this area.

5.8.35 Observations from the present evaluation considerably refine the observations made previously. Knowledge of the boundaries of the sequences has been extended,

therefore improving definition of dry ground/wet ground zones that may be associated with archaeological material.

Pleistocene

Aim 9 - Assess the palaeo-environmental potential and archaeological potential of any Pleistocene age deposits that may be preserved on the site

5.8.36 This aim has been satisfactorily accomplished. Certain deposits have been shown to contain artefactual, molluscan and/or small vertebrate evidence, and conversely certain deposits have been shown to be lacking in such evidence. In view of the sporadic occurrence of such evidence, it is still possible that certain sedimentary units may contain biological evidence in uninvestigated parts, or that undiscovered sedimentary units of restricted extent containing such evidence may be present.

5.8.37 Sediments containing molluscan evidence need to be more intensively sampled at finer vertical intervals to establish intra-unit vertical changes.

5.8.38 No sediments contained adequate small vertebrate evidence for palaeo-environmental and climatic reconstruction, and biostratigraphic dating.

Aim 10 - Recover detailed palaeo-environmental data from samples where appropriate

5.8.39 Pleistocene sediments were sufficiently sampled to establish their palaeo-environmental potential..

Aim 11 - Provide data to correlate any Pleistocene stratigraphy revealed with the results of previous CTRL investigations in the Ebbsfleet Valley, in particular Areas 8, 3 and 6 (URL 1997 ARC EFT97) and previous works within the Bakers Hole SAM (ARC ZR400)

5.8.40 The general height of certain deposits in Area 8 allowed general correlations with previously investigated deposits in the area (see figures 29 and 30). Fluvial sediments occur at two main levels, between 4m and 6m OD, and between –2m and 1m OD. The higher set may correspond to the Penultimate Interglacial complex of sediments known from previous work in this part of the site by the British Museum (Kerney & Sieveking 1977), Wenban-Smith (1995) and for pylon ZR4 (RLE 2000), and the lower set probably correspond to the Last Interglacial complex previously identified in Borehole 0021 SA (URL 1997). However these correlations are somewhat tentative in light of the confirmed tendency of deposits to slope and pinch out over short distances. Some of the palaeo-environmental evidence may help in dating certain mollusc-bearing sediments sufficiently precisely to establish a broad correlation with previously investigated deposits.

5.8.41 None of the deposits could be related to the Penultimate Interglacial fluvial channel sequence known from Areas 2 and 3. These generally occur at a higher level than any of the sediments under investigation.

5.8.42 Some of the deposits in Zone 2, including those containing Levalloisian artefacts, could be tentatively and broadly related to those previously known from Area 6 (Smith's Baker's Hole Levalloisian site), as well as those recorded by Burchell nearby to the west. As for Zone 1, correlations are not possible without more information on the geometry of the deposits, which cannot be achieved with currently available data, the exposures being too limited in extent. The key section for correlating the sequences transects Zone 2, linking it with the key area to the

south (Area 6) where parts of Smith's site are preserved. It should be noted that Burchell's Levalloisian horizon produced faunal remains, so such evidence may be present in other parts of the deposit.

Aim 12 - Provide data to update our understanding of the sub-surface topology and temporal and spatial distribution of sequences within the valley

5.8.43 See comments in 5.8.42 regarding the need for longer exposures to establish geometry, interpretation, correlation and stratigraphic relationships of deposits.

Aim 13 - Assess the potential of the data to contribute to objectives outlined in the ARS and RSPAPG, particularly to provide an updated geological model of the geometry of Pleistocene sedimentological facies and major depositional units, and to place them in a secure litho-, chrono-, and bio-stratigraphic framework

5.8.44 The evaluation has generated much information that will feed into existing explanatory models for Pleistocene sedimentary units within the Ebbsfleet Valley, providing a more detailed picture than has hitherto been possible. However the potential is limited by the very sparse artefactual and bio-stratigraphic evidence recovered to date, and the lack of direct and detailed data on key stratigraphic relationships - in particular the relationship between the presumed penultimate and last interglacial sediments (characterised by the ZR4 sequence and Borehole 0021SA respectively). These limitations mean that it is unlikely that major revisions to existing models will be possible in the light of the evaluation data.

Later prehistoric

Aim 14 - Assess the extent, nature and date of any prehistoric occupation and landuse within the evaluation area particularly that relating to the Neolithic period

5.8.45 Although Neolithic and Bronze Age flintwork was found in many of the trenches (figure 16), much of this material is believed to be residual, either because it was found in later contexts (eg 3807TT, 3830TT, 3807TT) or because of its worn condition (eg 3795TT, 3796TT and 3797TT).

5.8.46 Prehistoric pottery is more fragile and is therefore potentially a more reliable indicator of *in situ* prehistoric activity, although redeposited Neolithic? pottery was recovered from colluvium in 3837TT and in a deep fluvial sequence in 3797TT. *In situ* Neolithic and Bronze Age flint and pottery were found together in only two trenches (3834TT and 3836TT). The assemblages include a possible Ebbsfleet Ware rim, flint-tempered pottery and a concentration of flintwork in 3836TT with apparently discreet, stratified layers of Neolithic and Bronze Age material (figure 14). In the case of 3834TT a prehistoric archaeological feature was also present (figure 13). These finds indicate a focus of mid-late Neolithic and Bronze Age activity at the eastern extremity of the Gravel Spur (Zone 4) preserved in riverbank colluvial deposits and possible buried soil layers. This is the closest point of the study area to the Ebbsfleet Ware type site, which lies c.400m to the south and is c.160m south of STDR4 Trench 11, which produced a near complete Ebbsfleet Ware bowl (OAU 2000). This evidence contributes to an emerging pattern of mid-late Neolithic activity spread along the banks of the Ebbsfleet, with material now recovered from a 1200m stretch in the middle section of the valley.

5.8.47 Five very small and abraded sherds of undiagnostic prehistoric date were found in association with a woven roundwood structure of uncertain function, radiocarbon dated to the middle Bronze Age and found on top of the peat in Zone 3 (the Valley Bottom) (figure 8). The significance of this feature is difficult to judge without

exposing a larger area to establish its wider context, and relating the feature to possible Bronze Age activity on adjacent areas of dry ground. Although no firm evidence was found for Bronze Age dry land activity during the evaluation, it is quite likely that it is present, but obscured by Roman deposits. Considerable numbers of later prehistoric worked flint (many of them residual) were found in all areas except Zone 1. Particular concentrations were noted in the northern part of Zone 3 and the riverside area of Zone 4.

5.8.48 Late Iron Age pottery came from Trenches 3806TT, 3834TT and 3836TT. However, this material occurred only in contexts where it was associated with later (1st-2nd century Roman) pottery.

Roman and medieval

Aim 15 - Define the condition and extent of Roman activity associated with the Northfleet Villa site within the NKL connection embankment footprint

5.8.49 Extensive evaluation on the gravel spur has shown that many traces of the Roman villa survive. However, truncation by stone-robbing, peripheral activity associated with the quarry (including the tramway cutting) and previous archaeological investigation, have severely truncated or destroyed much of the Roman building complex, to the extent that, within the present evaluation area, wall footings rarely survive beyond a base layer of cobbles, and surfaces are only visible in isolated patches. A more complex stratigraphic sequence may survive in pockets in the vicinity of 3831TT (see comments on Aim 17 below). Although preservation is generally poor, sufficient of the stone building footings survive to establish a record of the overall layout of the complex and some elements of the construction phases. Cut features, including boundary ditches and a well, survive to variable depths and may be expected to produce sufficient artefactual evidence to allow reassessment of the chronology of the site.

5.8.50 Trench 3834TT revealed a complex series of well-preserved Roman features including possible evidence for Roman period landscaping of the bank of the River Ebbsfleet. Waterlogged structures may also be expected in this area, close to the present channel of the river. Further complex sequences of aquatic sediments have been located in Zone 3, immediately north of the dry ground spur on which the Roman buildings were constructed (3818TT/ 3819TT). These deposits consist of potential dry ground soil horizons adjacent to areas of apparent channel with evidence for Roman artificial revetment (3818TT) and dumped occupation debris. This complex of features may represent the position of a river channel during the later Prehistoric and Roman period, less than 20m north of the villa buildings. The close proximity of the Roman building complex to the channel edge offers excellent potential for the discovery of further structural remains and occupation debris, preserved in waterlogged conditions. A larger exposure of the interface between the dry ground and wetland deposits may be expected to shed light on Roman period management of the river channel and the economic relationship between the building complex and the river (figure 15).

5.8.51 There was considerable evidence for Romano-British activity concentrated on the edge of the alluvial basin in Zone 2, 150m west of the main building complex (figure 15). A cremation urn, of late Iron Age or Romano-British date, was found in 3806TT and there was much Romano-British activity in 3807TT. Most of the trench was occupied by a series of intercutting ditches, including a possible beamslot. The features produced large quantities Roman building debris including large limestone blocks and abundant tile and brick, possibly representing material from a building in

the near vicinity and/ or ground levelling above the margin of the alluvial basin. Pottery from this area is of 1st and 2nd century date.

Aim 16 - Establish the nature and extent of surviving archaeological deposits within the excavation areas previously opened by the Thameside Archaeological Group

5.8.52 Re-excavation of the TAG 'bathhouse' trench (3831TT) has shown that substantial remains of the wall footings survive, up to a height of c. 1m. Although the stratigraphy and any *in situ* finds contained therein have been removed within the excavation areas, the retained sections and small unexcavated areas to the east and south, may preserve a more complex sequence than survives anywhere else on the site. Some information on the construction phases may be recoverable. The degree of survival in this area may be due to the location of the bathhouse immediately adjacent to the wetlands, at a slightly lower level than the rest of the complex.

Aim 17 - Evaluate by means of limited trial pitting the depth and complexity of earlier strata sealed by the Roman levels

5.8.53 This aim has been largely addressed in Zone 4, although the age of some of the deposits remains uncertain. No Palaeolithic artefacts were found in this zone, although small mammal remains from Trench 3835TT indicate some potential for fossiliferous Pleistocene deposits.

5.8.54 Complex, artefact-bearing later prehistoric (Neolithic/ Bronze Age) deposits lie beneath Roman deposits in the trenches immediately adjacent to the River Ebbsfleet (3834TT and 3836TT), but elsewhere the Roman features are cut into largely sterile colluvial deposits of Pleistocene or early Holocene date.

5.8.55 In Zone 2, the Pleistocene sequence in 3807TT was sealed by numerous intercutting Roman features. A small test pit was machine-excavated to a depth of 4.5m following investigation of the Roman levels. No Palaeolithic artefacts or palaeoenvironmental evidence was found, but given the proximity of artefact bearing horizons in the three adjacent trenches to the south (3829ATT, 3829BTT, 3805TT, 3808TT), the potential of this area remains uncertain.

Aim 18 - Establish the presence/ absence of any structural remains associated with a possible location for a bath-house inferred by the previous evaluation

5.8.56 The remains encountered in the re-excavated TAG 'bathhouse' trench (3831TT) are not inconsistent with interpretation as a bathhouse, but the removal of the stratigraphy and structural features during the previous investigation means that little evidence was found to support the identification either. Many of the surviving elements, including furnaces and pilae bases, are likely to be part of a hypocaust system, but need not belong to a bathhouse.

Aim 19 - Establish the presence/ absence of any post-Roman occupation and land-use within the excavation area

5.8.57 Little evidence was recovered for post-Roman use of the site (other than modern quarrying and other activities). Slight evidence was recovered for Anglo-Saxon activity in the vicinity of the main villa complex in the form of a 2 sherds of pottery from a single ditch.

5.9 Archive storage and curation

5.9.1 The archive index is shown in Table 7. All samples/ residues have been retained pending decisions on whether any further analysis is required.

Table 7: Archive index

ITEM	NUMBER OF ITEMS OR BOXES OR OTHER	NUMBER OF FRAGMENTS / LITRES	CONDITION: W = washed; UW= unwashed; M = marked; P = processed; UP = unprocessed; D = digitised; I = indexed
ARC ESG 00			
Contexts records	581		I
Plans	42		D;I
Sections	73		I
Small finds			W;M;I
Films (monochrome)	16		I
Films (Colour)	15		I
Soil Samples (No.)	286		P
Monoliths	26		
Samples for C14	2		
Pottery	1 size 2	239	W;M;I
Tile and brick	1 size 1	428	W;I
Animal bone	2 size 1	174	W;M:I
Unworked burnt flint	2 size 2	711	W
Wood fragments	1 plastic size 5 1 size 1 1 size 6 2 unboxed	27	I
CBM	19 size 2	437	W;M;I
Copper alloy	See Iron	2	I
Fired clay	See misc	3	W;M;I
Flint	7 size 3	475	W;M;I
Glass	See misc	1	W;M;I
Iron	1 size 4	28	I
Misc	1 size 4		W;M;I

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APPENDIX 1 - POTTERY

1.1 Assessment of pottery

Paul Booth (late Iron Age, Roman and Saxon) and Alistair Barclay (prehistoric)

Introduction

1.1.1 The evaluation produced a small, multi-period pottery assemblage of some 239 sherds (3789 g), of which 87% by sherd count (94.5% by weight) was of Roman date. The pottery was generally in moderate condition; some sherds, particularly the pre-Roman ones, had slightly abraded edges, eroded surfaces and a relatively low average sherd weight of only 6.1 g. Preservation of the Roman material was also variable, but the average sherd weight (17.2 g) was considerably greater. The pottery was examined by context group and data recorded on standard record sheets. Sherds were assigned to major periods, although in some cases these identifications were tentative owing to the small size of the fragments and the absence of diagnostic characteristics. They were then recorded in broad fabric/ware groups using the coding system employed in the Oxford Archaeological Unit's Roman pottery recording system, but with reference to well-defined local terminology where appropriate. Quantification of these fabric/ware groupings was by sherd count and weight. Notes were also made on vessel typology, though many of the surviving rims were relatively undiagnostic of specific form.

Quantification by period

1.1.2 The breakdown of the material by broad period is shown in Table 8. Quantities of pottery by period per context are tabulated in Table 9.

Table 8: Summary quantification of pottery by period

Period	No. Sherds	Weight (g)
Neolithic-Bronze Age	17	88
Iron Age	11	83
Roman	208	3579
?Saxon	2	34
Post-medieval	1	5

Fabrics

1.1.3 General: Fabrics/wares were divided into two broad groups. Pre-Roman and Anglo-Saxon fabrics were defined in terms of their principal inclusion types but were not, at this stage, divided into tightly-defined individual fabrics. The 'Romanised' fabrics were assigned to established major ware groupings defined and coded on the basis of their principal common characteristic (eg R = reduced coarse wares). The post-medieval material was not characterised in detail in terms of fabric and is not discussed further.

1.1.4 Prehistoric fabrics: The sherds dated to the Neolithic/Bronze Age were with one exception all in flint-tempered fabrics. The exception was a small grog-tempered fragment, perhaps of Beaker type, from context 3787004. The flint-tempered fabrics varied in coarseness and most of the sherds were very small. A single, relatively large coarse flint-tempered rim sherd from context 3836013 was, almost certainly of the

Ebbsfleet style, and on this basis smaller undiagnostic sherds in a similar fabric were assigned to the early-middle Neolithic rather than later because of their associations with this piece. Only in context 3834021 were flint-tempered sherds, in a relatively fine, well-sorted fabric, attributed to the late Bronze Age, though even these could have been earlier in date.

1.1.5 Sherds dated to the Iron Age were more diverse in fabric. They included quartz sand-, glauconite-, shell- and vesicular- (?leached shell) tempered pieces (respectively 4, 1, 1 and 5 sherds). Most were potentially of middle Iron Age character, but some were too small for this to be certain. A shell-tempered sherd from context 3834014 was in a fabric akin to early Roman wares from north Kent, and might perhaps have been of that date. More clearly, a glauconite-tempered jar rim from the same context was of late middle Iron Age character. Grog-tempered 'late Iron Age' fabrics have been grouped with the Roman pottery, however.

1.1.6 Roman fabrics: The fabric groupings, with quantification, are given below:

S. Samian ware (unspecified sources). 2 sherds, 1 g.

S20. South Gaulish samian ware. 1 sherd, 85 g.

S30. Central Gaulish samian ware. 6 sherds, 97 g.

S40. East Gaulish samian ware. 5 sherds, 104 g.

F45. ?Rhineland (white) colour-coated fabric. 1 sherds, 3 g.

A10. Sandy buff ?amphora fabric. 1 sherd, 15 g.

A11. South Spanish (as Dressel 20) amphora fabric. 1 sherd, 38 g.

M28. S.E. England buff/white mortarium fabric. 1 sherd, 206 g.

W. White wares (unspecified). 1 sherd, 3 g.

W10. Fine white ware. 1 sherd, 2 g.

W40. Fine white/pink wares (local). 2sherds, 8 g.

Q50. Fine white-slipped oxidised fabric. 1 sherd, 7 g.

E80. Grog-tempered 'Belgic type' fabrics. 22 sherds, 405 g.

O10. Fine oxidised fabrics. 2 sherds, 12 g.

O20. Coarse sandy oxidised wares. 3 sherds, 25 g.

O50. Fairly fine sandy oxidised fabrics. 3 sherds, 25 g.

O80. Coarse (usually grog) tempered oxidised fabrics. 14 sherds, 133 g.

O85. Patchgrove ware. 1 sherd, 10 g.

R10. Fine reduced fabrics. 3 sherds, 152 g.

R16. 'Upchurch' fine reduced ware. 8 sherds, 61 g.

R20. Coarse sandy reduced fabrics. 11 sherds, 175 g.

R25. Canterbury sandy reduced ware. 1 sherd, 54 g.

R30. Medium sandy reduced fabrics. 88 sherds, 1380 g.

R39. Alice Holt sandy reduced ware. 1 sherd, 29 g.

R70. Calcareous reduced fabrics. 1 sherd, 38 g.

R90. Coarse (usually grog) tempered reduced fabrics. 1 sherd, 22 g.

B11. Black-burnished ware (BB1). 1 sherd, 26 g.

B20. Black-burnished ware (BB2). 23 sherds, 415 g.

C10. Coarse shell-tempered fabrics. 2 sherds, 48 g.

1.1.7 Relatively few of the fabrics could be assigned to specific sources with confidence, though most can be roughly located. The reduced coarse wares may have included probable Canterbury products (particularly in the R30 group), and one rim sherd was assigned to that source (fabric R25) but oxidised Canterbury fabrics were not evident. Fine reduced sherds (R16) are attributable to the North Kent Upchurch ware industry, and some other R10 sherds might also have originated there. B20 (BB2) and C10 shell-tempered sherds are also likely to have been local North Kent products. The R30 fabric group probably also included North Kent sandy grey wares as well as Canterbury products, and it is quite likely that it also included small body sherds of BB2, since the latter is not always readily identifiable on the basis of fabric alone. The 'fine and specialist wares' (samian, fine wares, amphorae, mortaria etc) included typical regional products such as mortarium fabric M28 and white and white-slipped wares, though all in very small quantities. Imports included samian ware, two amphora fragments and a beaker sherd in fabric F45, attributed to the Rhineland. The only identified extra-regional British imports were single sherds of BB1 (B11) and Alice Holt reduced ware (R39).

1.1.8 Anglo-Saxon: Two sherds were assigned a Saxon date on fabric criteria. Both were quite coarsely sand tempered and occurred in a ditch feature (3833004) where they were associated with Roman material. Their dating is not absolutely certain, but apart from their general character is supported by the fact that the sherds were relatively large and fresh, whereas residual Iron Age sherds in this context might have showed more evidence of redeposition.

Forms

1.1.9 Some 38 Roman vessels were represented by rim sherds. Six of these were in samian ware (forms 33, 31(3) and 37(2)). A hook rimmed mortarium in fabric M28 had a double herringbone stamp (cf Hartley 1981 no. 364, dated 140-180). Apart from a simple rimmed jar in fabric E80, a lid-seated jar type in fabric C10 and a small ?lid in fabric O20 the remaining vessels were a range of jars, bowls and dishes in reduced fabrics, including BB2. The nine vessels in the latter fabric were all bowls and dishes, though body sherds of 'cooking pot type' jars were noted.

Context and Chronology

1.1.10 Flint-tempered sherds possibly of Neolithic date, together with the possible Beaker sherd, came from Trenches 3787TT and 3797TT in the western part of the site. The most significant concentration of flint-tempered sherds came, however, from Trench 3836TT at the eastern margin of the site. This material, including a probable Ebbsfleet style rim, was associated with significant quantities of flintwork in a sequence of deposits potentially of middle to late Neolithic date. Flint-tempered pottery from a gully in Trench 3834TT, quite close to 3836TT, was thought to be of late Bronze Age date, but an earlier date is possible, as mentioned above.

1.1.11 Iron Age pottery came from Trench 3806TT and from Trenches 3834TT and 3836TT at the eastern end of the site. However, none of this material occured in contexts where it was not associated with later material. The lack of diagnostic pieces makes dating difficult, but the frequent association with later pottery might suggest that these sherds belong to the later part of the Iron Age and derive from areas where there was potentially activity through from the Iron Age into the early Roman period. The most characteristic ceramic marker of this period, however, grog-tempered wares (fabric group E80), were relatively scarce, being found in only four contexts (in Trenches 3806TT, 3807TT, 3820TT and 3834TT) while Thameside shell-tempered wares, also characteristic of this period, were almost entirely absent.

1.1.12 The great majority of the pottery was in Romanised fabrics. It was distributed across 11 trenches (3807TT, 3818TT, 3819TT, 3820TT, 3828TT, 3830TT, 3833TT, 3834TT, 3835TT, 3836TT and 3837TT), but only three of these (3807TT, 3820TT and 3834TT) produced more than 10 sherds, and more than half of the Roman assemblage (by sherd count) came from Trench 3807TT, lying over 100 m west of the villa buildings. The relative paucity of pottery associated with these buildings may presumably be a consequence of previous work in the same area, which has left relatively little material to be recovered from the contexts examined. The pottery recovered dates principally to the 1st-3rd centuries. It is very difficult to define the upper end of the date range, though the majority of the pottery does not suggest activity much beyond the middle of the 3rd century AD. Characteristic late Roman fabrics, such as Oxford products, late Nene Valley colour-coated wares and late shell-tempered ware, are conspicuous by their absence, though they were present in small quantities in the 1997 evaluation. The only distinctive late Roman sherd noted was a fragment of Alice Holt grey ware, from context 3820015.

1.1.13 The two probable early Anglo-Saxon sherds came from a ditch, 3833004. This contained a few Roman sherds and may have been Roman in origin. The occurrence of Anglo-Saxon material in such features is paralleled quite widely and its occurrence here reflects the suggestion in the 1997 evaluation report that Saxon activity probably concentrated around the Roman building complex, if not within it, although none of the Saxon sherds recovered then were specifically from 'Roman' features.

General Comments

1.1.14 The pottery assemblage, while larger than that from the 1997 evaluation (which produced only 68 Roman sherds) was still small. The extent to which deposits within or adjacent to the Roman buildings had already been disturbed by earlier excavation, was presumably again a factors affecting the quantity of material recovered. It is important to note in this respect that the evaluation in the villa area was, wherever possible,

limited to re-exposing previously exposed features in order to preserve the few surviving areas of stratigraphy.

1.1.15 The Neolithic material, while also very limited in quantity, is of some significance. The chronological emphasis of the flint-tempered material recovered in 2001 contrasts with that indicated by the 1997 evaluation. This may reflect the different character of the more recent evaluation, with an emphasis on the deeper parts of the site sequence, but it may also suggest that some of the material recovered in 1997 was earlier in date than thought and underlines the difference in interpretation prompted by the occurrence even of a single diagnostic sherd (in this case the Ebbsfleet style rim). Without such sherds, flint-tempered pottery could as well be of later Bronze Age than earlier date, and this was the assumption made in 1997. It remains possible, of course, that both the Neolithic and the later Bronze Age are represented by the flint-tempered sherds from the site.

1.1.16 The Roman material from the 1997 evaluation was interpreted as indicating activity throughout most of the Roman period. The more recently recovered pottery suggests that the bulk of activity fell within the middle of the Roman period. It may be that the survival of late Roman deposits is particularly patchy. This would not be surprising in view of the recent history of the site. It is also possible that the relatively superficial (in the physical sense) examination of the site in 1997 resulted in a disproportionately high representation of late Roman pottery. In both cases, however, the quantities of material are small and must be assessed with caution. It is clear that there was at least some late Roman activity at the site which presumably formed the basis for the subsequent Anglo-Saxon presence. The present assemblage therefore adds relatively little to the broad understanding of the site at present.

1.1.17 As noted previously, the Roman assemblage consists of local, regional and extra-regional components, all of which can be seen as consistent with known patterns of pottery supply in Kent. It contains nothing which augments or modifies the picture of these patterns as currently available. Again, the assemblage is too small for analysis of differing proportions of fabrics and vessel types to be meaningful, nor does it permit inferences on specific aspects of site function and status to be drawn.

Assessment of potential and further work

1.1.18 The present assemblage (together with that from the 1997 evaluation) is small and its potential for further analysis is therefore limited. It is of some importance for understanding the chronology of the site, particularly in the pre and post-Roman periods. At present the assemblage has no potential for providing data on trade and status and functional aspects of the site because of its small size. In the event of further work on the site the present material could be added to any resulting assemblage and recorded in line with it. If no further fieldwork is carried out the only components of the present assemblage requiring more detailed consideration would be the Neolithic/Bronze Age and Anglo-Saxon material.

Table 9: Quantification of pottery by context and period

Context	Neolithic/ Bronze Age		Iron Age		LIA/ Roman		Anglo-Saxon		Post-medieval		Date/Comment
	No	Wt	No	Wt	No	Wt	No	Wt	No	Wt	
3787004	2	6									late Neolithic/EBA
3797008	3	12									?Neolithic - 2/8 perhaps fired clay
3806003			2	11	1	7					?1C AD
3807003					9	76					late 2C +
3807008					4	99					2C
3807009					1	47					?2C +
3807016					1	4					late 1C-2C
3807018					24	752					mid-late 1C +
3807027					5	56					?mid 2C +
3807031					9	136					late 2C +
3807035					1	16					mid 2C +
3807038					9	179					2C
3807041					1	18					mid 2C +
3807045					1	3					2C
3807047					2	10					2C +
3807048					5	100					late 1C-2C +
3807049					41	411					?mid-late 2C
3807050					7	169					mid 2C +
3807057					18	385					1C
3815013			5	6							
3818012					1	15					2C +
3819007					2	75					2C +
3820004					7	104					mid 2C +
3820005					4	37					?mid 2C
3820013					3	70					2C +
3820015					9	346					?4C 1 sh R39, rest ?2C
3820017					2	77					2C +
3828004					2	4					late 1C-2C
3830002					5	33					2-3C
3830003					1	85					late 1C?
3833002					1	5			1	5	19C
3833004					3	15	2	34			?early Anglo-Saxon
3833008					3	58					?1-2C
3833013					2	22					late 1C +
3834005			1	24	1	7					2C + ?
3834012					1	3					mid 2C +
3834014			2	25	12	65					?late 1C-2C
3834019					2	11					?1-2C
3834021	4	17									?LBA, possibly earlier
3834023					2	7					1C
3835002					1	16					2C +
3836006					3	14					2C +
3836007			1	17	1	4					?1C
3836012	3	8									?Neolithic
3836013	5	45									?Neolithic - 1 sherd Ebbsfleet type
3837007					1	38					1-3C
TOTAL	**17**	**88**	**11**	**83**	**208**	**3579**	**2**	**34**	**1**	**5**	

APPENDIX 2 - BUILDING MATERIALS AND FIRED CLAY

Kayt Brown

2.1 Assessment of ceramic building material

Introduction

2.1.1 The assemblage was recovered by hand excavation and sieving in accordance with the Fieldwork Event Aims for the site, which are set out in Section 1 of the main report, above. The primary aim of collecting the ceramic building material was to determine whether it provided any evidence for the form, date or function of Romano-British settlement in the vicinity.

Quantification

2.1.2 A total of 428 fragments of ceramic building material, weighing 97.48 kg, was recovered during the evaluation. All of this material is Roman in date. The material was in a good condition, with two complete *imbrex* tiles and a number of substantial *tegula*, *imbrex* and flat tile fragments. The assemblage was quantified by sherd count and weight, by fabric and type for each context. The data is presented in Table 10 and Table 11.

Methodology

2.1.3 The material was scanned briefly by context group, and divided by fabric and type. Fabrics were identified by characteristics visible to the naked eye with some examples checked under binocular microscope (x20 magnification). Brick and tile thickness was recorded to aid the identification of types, and where present *tegula* flange height, signatures, graffiti and other marks were also recorded. The condition of the fragments was also noted, as was the presence of mortar. Recording was undertaken following the system used at the Oxford Archaeological Unit and a copy of the codes used is available in the archive.

Fabrics

2.1.4 The range of fabrics present is consistent with those noted in the previous evaluation at the site (Booth 1997). Although an attempt was made to distinguish fabrics during the recording process it became evident that the variations observed are likely to relate to the same basic fabric. This principal fabric was red to red brown, (occasionally hard fired with a grey core) and contained sparse quartz, occasional iron ore and white calcareous inclusions. These inclusions occurred in varying proportions. Occasionally the fabric did not appear to have been prepared prior to use. A few fragments in a sandier fabric were also identified (11 fragments, 5068 g).

Types

2.1.5 The range of material represented included both roof and flat tiles, with a small number of box-flue tiles and tesserae. A large proportion of the assemblage could not be identified to type, comprising small fragments which displayed no diagnostic features and from which no measurements could be taken. The breakdown of tile types was as follows:

Table 10: Quantification of Roman CBM by type

Type	No.Frags	% Frags	Weight (g)	% Weight
Uncertain	111	25.9	3111	3.2
Tegula	89	20.8	35137	36.0
Imbrex	101	23.6	25063	25.7
Box flue tile	5	1.2	933	1.0
Plain flat tile	114	26.6	31958	32.8
Brick	1	0.2	472	0.5
Tessarae	5	1.2	93	0.1
Unidentified	2	0.5	656	0.7
Total	**428**	**100**	**97483**	**100**

2.1.6 Complete tiles comprised two *imbrex*. Fragments of *imbrex* were identifiable by the characteristic curved shape. The identification of *tegulae* was based on the presence of a flange, flange scar, signature or evidence for cut-outs. It is probable that *tegulae* fragments are under-represented in the table above as in the absence of any diagnostic features, fragments could only be assigned to the plain flat tile category. However it may be possible to identify *tegulae* fragments based on tile thickness; the thickness of identifiable *tegulae* clustered between 15-23mm. A number of *tegulae* fragments displayed signature marks, usually single grooves in an arc. A single fragment displayed indecipherable graffiti. Characteristic combing identified box-flue tiles, some of which had mortar attached. The largest category was that of plain flat tiles, although as mentioned this figure may include unidentifiable *tegulae* fragments. These tiles ranged from 10 to 39mm in thickness, although quite substantial pieces were recovered, all measuring 35mm in thickness. A large number (92) occurred in the 15-23mm range. The absence of complete dimensions prevented the identification of precise tile types. One flat tile displayed a paw-print on the upper surface. A single example of a brick measured 40mm thick. A small number of crude *tesserae* were also present. These tended to measure 25 – 30 mm square. A single large lump and small fragment of material containing crushed brick was also recorded.

2.1.7 The range of material reflects that from the previous evaluation, although the ratio of *tegulae* to *imbrex* was not as clear-cut. Flat tiles again formed the major component (by count) of the assemblage, however *tegulae* were more important by weight. The range of tile types is consistent with the recorded evidence for Roman structures in this area.

Provenance

2.1.8 Roman tile derived from 38 contexts in 12 trenches. Theses trenches were concentrated on the gravel spur around the recorded buildings, although some material also occurred in Zone 3 (Valley Bottom) and Zone 2 (South Valley Side), including a large assemblage from Trench 3807TT.

2.1.9 A large amount of material was recovered from Trench 3820, located close to the Villa footings recorded in 1913. This included the examples of complete *imbrex*. A substantial amount of the assemblage was recovered from trench 3807, including a wide range of types. This is a considerable distance from the villa and would suggest further buildings in this area.

Potential for Further Work

2.1.10 Although a relatively small quantity of material was recovered this material adds significantly to the material recovered during previous investigations at the site, and

suggests the presence of buildings to the west of the villa. The range of material provides details on the type of structures on site, such as the presence of *tesserae* and box-flue tile. Further work would need to incorporate all the material recovered during the various stages of fieldwork at the site.

Table 11: Quantification of ceramic building material

Context	Count	Weight (g)	Comments
3795002	5	8	
3797002	1	30	
3806003	6	203	
3807003	85	14470	
3807007	1	371	
3807008	2	428	
3807009	1	214	
3807018	79	15970	
3807026	1	170	
3807031	3	345	
3807047	1	848	
3807048	1	23	
3807049	3	123	
3810003	1	22	
3810011	1	109	
3814004	1	3	
3818012	2	229	
3818025	9	2688	
3819007	13	3738	
3820003	43	12186	
3820004	3	204	
3820007	12	628	
3820013	11	1270	
3820015	3	936	
3820017	30	22048	Complete imbrex
3828004	5	709	
3833002	19	1550	
3833004	18	1768	
3833005	11	1822	
3834005	11	3757	Graffiti on flat tile
3834014	21	353	
3834019	1	449	
3835002	8	231	
3836006	1	393	
3836007	4	299	
3836008	5	6793	
3837007	6	1774	
3837008	3	321	
Total	**428**	**97483**	

APPENDIX 3 – LITHICS

3.1 Introduction

3.1.1 A small assemblage of worked flint, including both Palaeolithic and later prehistoric material, was recovered during fieldwork and from sieving.

3.1.2 The flint was recovered in accordance with the Fieldwork Event Aims set out in section 2 of the main report, above. The primary aim of retrieving and examining the flint was to establish its typology and date. This was undertaken to provide evidence of the character and date of prehistoric occupation on the site.

3.2 Palaeolithic Worked Flint

Dr. Francis Wenban-Smith

Methodology

3.2.1 Flint collected from the fieldwork was examined. This included material from the spit-sampling programme, and artefacts noted during machine excavation and section cleaning. Natural flint pieces were discarded, and the remaining artefacts recorded. Information was noted concerning their technological nature, typological affiliations general condition. The material was added to an Access database.

Quantification

3.2.2 In total 16 Palaeolithic flint artefacts were recovered (Table 8) from Pleistocene deposits, two from Zone 1, 13 from Zone 2 and one from Zone 3.

Provenance

3.2.3 All the Palaeolithic artefacts came from fluvial or colluvial/solifluction deposits and hence have been derived from their original place of deposition. Those in colluvial /solifluction deposits (those from 3783TT, 3805TT, 3829ATT and 3829BTT) may not have been transported far from their place of origin, and will not have been affected by selective dispersal or size-sorting. Those from fluvial deposits (3806TT, 3807TT, 3808TT and 3828TT) may have been transported further, and are liable to have affected by size-sorting.

Condition

3.2.4 One of the undiagnostic waste flakes from 3829ATT (context 3829002, spit-sample 1) is in fairly fresh condition, although not mint. All other artefacts are moderately or very rolled and/or abraded.

Discussion and comparative material

3.2.5 The assemblage is not large, but includes several diagnostic Levalloisian elements, similar to those present in material from RA Smith's Baker's Hole site (from chalk solifluction deposits at 10-15m OD c. 150m to the southeast of Zone 2) and material from Burchell's Levalloisian floors from layers of silty sand and gravel at 5-10m OD c. 100m to the west of Zone 2. Most of the material in the evaluation collection (from 3829ATT, 3829BTT and 3808TT) is most similar to that from RA Smith's assemblage,

and is probably either derived from, or part of, the same deposit as his collection. The large Levalloisian blade from 3805TT could fit in with either Smith's or Burchell's collection, although its gravel context (possibly fluvial) is more similar to that from which Burchell's collection was recovered.

Potential for Further Work

3.2.6 It is still uncertain from the small test-pits in Zone 2 from which most of the archaeological material was recovered (3805 TT and 3829A,B TT) what was the mode of formation of the containing deposits. Excavation of larger test-pits in this area would reveal the geometry of these deposits, which would help greatly in interpretation of their mode of formation and their relationships to other artefact-bearing deposits previously researched by Smith and Burchell.

3.2.7 Excavation of larger quantities of the artefact-bearing deposits in the small test-pits in Zone 2 from which most of the archaeological material was recovered (3805 TT and 3829A,B TT) would produce a more substantial artefact collection, clarifying the nature and range of the technology and typology, and helping in interpretation of its relationship to other assemblages previously recovered by Smith and Burchell.

Table 12: Summary of Palaeolithic flint artefacts from ARC ESG00

Zone	Trench	Context	Sample	Quantity	Description
1	3783TT	3783005	-	2	Undiagnostic waste flakes
2	3805TT	3805007	-	1	Large Levalloisian blade
		3805011	S.7	1	Large flake, with facetted butt (broken); prob. from upper surface Lev. core, although not v. regularly shaped
	3806TT	3806005	1	1	Undiagnostic waste flake
	3807TT	3807058	1	1	Undiagnostic waste flake, (blue-white patinated)
	3808TT	3808004	-	2	One large flake (broken), with facetted butt; prob. from upper surface Lev. core, although not v. regularly shaped One crude/failed Lev. core, with facetting at one end for major removal
	3829ATT	3829002	1	3	One Levalloisian flake with facetted butt plus signs preferential shaping Two undiagnostic waste flakes
			3	3	Three undiagnostic waste flakes
	3829BTT	3829012	1	1	Small flake/blade with parallel laminar dorsal scars

Zone	Trench	Context	Sample	Quantity	Description
3	3828TT	3828009	-	1	Undiagnostic waste flake

3.3 Assessment of later prehistoric worked flint

Hugo Lamdin-Whymark

Introduction

3.3.1 A total of 385 flints and 718 pieces of burnt unworked flint (weighing 11,590 Kg) were recovered from later prehistoric contexts. The assemblage included a small number of late Mesolithic and Early Neolithic flints, but was dominated by middle Neolithic to early Bronze Age material. Several trenches also produced flint that on technological ground belong to the middle to late Bronze Age.

Methodology

3.3.2 The flint was briefly scanned, with information regarding dating, technology and general condition being noted. The material was added to the fieldwork event computer dataset.

Quantification

3.3.3 A total of 385 struck flints and 718 pieces of burnt unworked flint (weighing 11,590 Kg) were recovered from a wide of variety of contexts. The flint assemblage is summarised below in Table 13 incorrect formatting and the burnt flint in Table 14. Later prehistoric worked flint was recovered from many of the trenches, often as residual material in Roman features, but there were notable concentrations in a only a few, including 3836TT which alone produced 150 worked flints.

Provenance

3.3.4 The complex sequence of deposits identified in the evaluation made it difficult to establish the provenance of the material recovered. However, it is possible to observe a broad pattern.

3.3.5 Significant numbers of flints were recovered from Trenches 3795TT, 3797TT and 3799TT. In general, the flint from these trenches appears to be Neolithic, although some Bronze Age material was present. The condition was exceptionally variable and heavily rolled pieces were common, suggesting that the majority of this group were not *in situ*.

3.3.6 A second distinct concentration of lithics is present to the east of the site in Trenches 3833TT to 3836TT, accounting for over 50% of the assemblage (219 flints). Whilst the condition of the flint from 3833TT indicates that it is most probably residual, 3834TT and 3835TT contain assemblages with a high proportion of apparently well stratified, possibly *in situ* material. In particular the flint in Trench 3836TT is in fresh condition and occurs in chronologically distinct layers, such that middle to late Neolithic flintwork in deposit 3836015 is overlain by late Neolithic to early Bronze Age flint work in 3836013. A late Mesolithic rod microlith recovered from context 3836013 is considered to be residual.

3.3.7 The character of the flint from 3836TT differs from the rest of the site, yet is consistent throughout the stratigraphic sequence within the trench. Significant numbers of the worked flints were burnt and substantial quantities of burnt unworked flint was recorded. A high proportion of the flints also exhibited edge damage resulting from use, although in general the proportion of retouched artefacts was low and confined to scrapers and edge retouched flakes. Hand excavation of a 1m square sondage through the deposits indicates that the sequence contains high densities of flint. Deposit 3836013 contained approximately 80 flints per m^3, whilst deposits 3836014 and 3836015 contained 50 flints per m^3. These densities are comparable to midden deposits encountered at Hazleton (Saville, 1990 169) and at Eton Rowing Lake (Lamdin-Whymark, forthcoming). The same sondage produced a notable concentration of Neolithic/ Bronze Age pottery, including one sherd of Ebbsfleet Ware.

3.3.8 Small numbers of flints were recovered from many of the other trenches excavated. They were concentrated towards the south of the site in Zone 2, particularly on the margins of the alluvial basin. Both Neolithic and Bronze Age flints were recovered, exhibiting varying degrees of post depositional edge damage. This material is probably not *in situ*. Neolithic and Bronze Age flints were also recovered from waterlogged deposits in Zone 3 (the valley bottom), although only in small numbers. The condition of many of these flints was fresh but too few were recovered to comment in detail.

Condition

3.3.9 The condition of the flint recovered from the evaluation was exceptionally variable. Several contexts contained flints in a very fresh condition; in general these pieces were uncorticated, although a small number of flints exhibited a light white cortication. Several contexts contained flints that were exceptionally rolled, most probably resulting from fluvial action.

Comparative Material

3.3.10 Comparative material is available from several sites within very close proximity to the site. These include excavations at the Ebbsfleet ware type site which lies approximately 250 to the south of the site (Burchell 1938, Burchell and Piggott 1939 and Sieveking 1960). In addition, material is available from earlier evaluations of the current site (URL 1997) and investigations at STDR4 on the opposite side of the valley, which are currently ongoing.

Potential for Further Work

3.3.11 It is apparent from the distribution of flints over the majority of the site, that there is considerable potential for the recovery of significant flint assemblages, and *in situ* assemblages should be anticipated in localised areas. The highest potential appears to lie at the eastern extremity of the gravel spur, immediately adjacent to the present channel of the River Ebbsfleet. The deposits in Trench 3836TT may prove to be of considerable significance, particularly given their proximity to nationally important Neolithic sites. The sequence of deposits 3836013 to 3836015 contained stratified flintwork spanning the middle Neolithic to Early Bronze Age. Zone 3 (the valley bottom) may also produce considerable numbers of flints although the majority may prove to be residual.

Table 13: Quantification of later prehistoric flint

Context	Count	Period	Comments
3708060	1		1 irregular waste
3783006	1		1 flake
3787002	2		1 end scraper, 1 retouched flake
3789002	1		1 flake
3789004	1		1 flake
3794004	1		1 irregular waste
3794005	2		2 flakes
3795004	32	Neolithic	Fresh, but some very rolled. 20 flakes, 1 blade-like flake, 2 irregular waste, 1 multi-platform flake core, 2 end scrapers, 1 side scraper, 1 other scraper, 1 serrated flake, 2 notches, 1 backed knife
3797003	1		1 blade-like flake
3797005	8	Neolithic?	Some fresh, mainly very rolled, 3 flakes, 1 blade, 1 irregular waste, 2 notches, 1 retouched flake
3797008	4		2 flakes, 1 blade, 1 other heavy implement (small bifacially retouched pick)
3799003	16	Neolithic and Bronze Age	Rolled Neolithic, fresher Bronze Age flint. 14 flakes, 1 Keeled core, 1 end and side scraper
3799004	2		1 flake, 1 end scraper
3800003	1		1 tested nodule
3803004	1		1 irregular waste
3806003	14	Neolithic	Fresh and a few rolled, 11 flakes, single platform flake core, 2 backed knifes
3807003	4		1 flake, 1 end scraper, 1 scraper on a non-flake blank, 1 notch
3807018	5	Neolithic?	Rolled, 2 flakes, 1 blade, 2 retouched flakes
3807031	2		2 flakes
3807047	14	Neolithic to Bronze Age	Mainly rolled, 12 flakes, 2 irregular waste
3807049	1		1 flake
3807051	1		1 flake
3808003	5	Bronze Age	Fresh, Large trimming flakes, 5 flakes
3809011	3		1 flake, 1 blade, 1 axe thinning flake
3810012	2		1 blade, 1 fragmentary flake core
3812012	1		1 blade
3814017	1		1 notch
3815013	3		3 flakes
3816005	13	Bronze Age? + Neolithic?	7 flakes, 2 blades, 1 blade-like flake, 2 irregular waste, 1 tested nodule
3818018	8	Neolithic?	Thin Flakes, many used, 7 flakes, 1 blade-like flake
3818024	1		1 flake
3820015	1		1 flake
3828006	5		4 flakes, 1 multi-platform flake core
3829001	2		2 flakes
3829014	1		1 flake
3830002	1		1 flake
3830003	1	Bronze Age?	1 denticulate
3833002	6		5 flakes, 1 blade-like flake
3833004	3		2 flakes, 1 tested nodule
3833009	1		1 flake

Context	Count	Period	Comments
3833013	1		1 flake
3834007	4		4 flakes
3834009	2		1 blade, one tested nodule
3834012	2		2 blades
3834017	4		3 flakes, 1 irregular waste
3834019	6		3 flakes, 1 irregular waste, 1 other blade core, 1 tested nodule
3834021	12	Mainly Bronze Age, some Neolithic	Good condition, slight Post depositional edge damage, 7 flakes, 2 blade, 1 irregular waste, 1 tested nodule, 1 fragmentary core
3834027	5		2 flakes, 1 blade, 1 multi-platform flake core, 1 denticulate
3835002	8	Mainly Bronze Age, some Late Neolithic	Rolled Late Neolithic core, other material Bronze Age, 5 flakes, 1 blade, 1 blade-like flake, 1 discoidal core
3835004	7	Some Neolithic?	5 flakes, 1 irregular waste, 1 core on a flake
3835008	5		4 flakes, 1 blade-like flake
3835009	3	Neolithic?	1 flake, 1 multi-platform blade core, 1 notch
3836012	27	Late Neolithic/early Bronze Age?	20 flakes, 1 blade, 2 irregular waste, 1 rejuvenation tablet, 2 tested nodules, 1 end and side scraper
3836013	46	Late Neolithic/early Bronze Age?	Occasional earlier Neolithic Pieces and a Late Mesolithic rod microlith. 31 flakes, 1 blade-like flake, 3 irregular waste, 1 tested nodule, 1 rejuvenation flake core face/edge, 4 tested nodules, 2 multi-platform flake cores, 1 rod microlith, 2 end and side scrapers
3836014	9	Neolithic?	7 flakes, 1 blade, 1 retouched flake
3836015	67	Middle to late Neolithic	Fresh condition, numerous burnt pieces and utilised flints. 46 flakes, 9 blades, 3 blade-like flakes, 3 irregular waste, 2 chips, 1 tested nodule, 1 multi-platform flake core, 2 fragmentary flake cores
3836016	1		1 chip
3837003	2		1 blade, 1 tested nodule
3837007	1		1 blade-like flake

Table 14: Quantification of burnt unworked flint

Context	Count	Weight	Comments
3707047	2	33	
3789004	20	381	
3794005	1	93	
3795002	2	14	
3795004	33	422	
3796004	2	111	
3796005	3	78	
3797003	1	10	
3797005	7	176	
3800003	1	45	
3806003	21	427	
3807041	1	17	

Context	Count	Weight	Comments
3809011	1	35	
3815013	14	334	
3816005	2	77	
3818024	1	22	
3818025	1	48	
3833008	10	122	
3834007	131	1171	
3834009	4	32	
3834010	43	587	
3834012	20	154	
3834014	6	136	
3834016	63	434	
3834017	4	141	
3834019	7	116	
3834021	20	398	
3834023	44	628	
3834027	1	5	
3835002	2	43	
3835004	1	18	
3835008	18	937	
3836005	3	175	
3836007	1	27	
3836013	104	1526	
3836014	31	862	
3836015	92	1755	

APPENDIX 4 - METALWORK AND METAL-WORKING RESIDUES

4.1 Assessment of metalwork

by Ian Scott

Introduction

4.1.1 This assessment considers the metalwork recovered during the evaluation. All material was hand-recovered.

Methodology

4.1.2 The metalwork assemblage was scanned and quantified by number and a preliminary identification was made of all objects and fragments. The assemblage is small and it was therefore not necessary to sample. The fieldwork event name and code, context, and, where appropriate, the small find number were recorded, together with a basic quantification by number and preliminary identification. The information was entered onto a database to create a basic dataset.

Quantification

4.1.3 The assemblage (Table 15) comprises 20 objects, comprising 2 copper alloy, 1 possibly of lead and iron and 17 iron objects. The iron objects include 11, possibly 12, nails.

Provenance

4.1.4 Although only the Fibula is intrinsically datable to the Roman period, the remaining metal finds derive from the area of Northfleet Roman Villa (3820TT, 3830TT) or trench 3807TT, both of which show evidence for intensive Roman activity. Most, if not all of the material is therefore likely to be of Roman date.

Conservation

4.1.5 The current packaging is adequate for long term storage. The brooch may require cleaning.

Potential for Further Work

4.1.6 Apart from the brooch the material has little potential for further analysis, although the assemblage should be retained and reassessed in the light of future fieldwork results.

Table 15: Quantification of metalwork

Context	Sf no.	Material	Count	Period	Type	Comments
3807018	116	Cu alloy	1	RO	Fibula	part of fibula
3820004	117	Cu alloy	1		Pin or needle	pin or needle of tapering round section stem. Towards wider end there is either lamination due to corrosion or an indeterminant decorative feature.
3807050		pb & fe?	1		Object	tubular object, formed from lead wrapped around an iron(?) core.
3807050		fe	1		Loop	loop fromed from iron rod of circular section
3820003		fe	3		Nail	nails, hand made. Tapering stems of square section and flat circular heads. Complete or near complete
3820003		fe	1		Object	flat piece of iron. Uncertain function. Possibly cast iron.
3820004		fe	5		Nail	nails, handmade. Tapering stems of square section and flat circular heads. 3 complete or near complete; 1 incomplete nail; 1 fragment of nail stem or bar.
3820015		fe	2		Nail or dog	nail or dog in two pieces.
3820015		fe	1		Nail	nail, handmade. Tapering stem, the cross section is unclear due to corrosion.
3800017		fe	1		Nail	nail, handmade. Tapering stem of square cross section, almost complete.
3830002		fe	1		Lump	amorphous lump
3830002		fe	1		Lump	object encrusted with corrosion products
3830004		fe	1		Lump	amorphous lump or possible nail head
		Total	**20**			

4.2 Assessment of slag

Valerie Diez

Description

4.2.1 Two small fragments of slag were recovered by hand excavation from Trench 3806TT and 3834TT (Table 16). They both appear to be iron slag.

4.2.2 Considering the very small size of this assemblage, there is no potential for further work.

Table 16: Quantification of slag

Context	Material	Count	Weight (g)	Period	Comments (description)
3806006	Slag	1	7		iron slag
3834005	Slag	1	34		iron slag
Total		**2**	**41**		

APPENDIX 5 - WORKED WOOD

Damian Goodburn

5.1 Assessment of worked wood

Introduction

5.1.1 Worked wooden structures were discovered in waterlogged conditions at two locations in the valley bottom (Zone 3) during the evaluation (3815TT, 3818TT).

Methodology

5.1.2 Worked wooden structures were recorded in two trenches in the course of the evaluation: The structures were initially identified and exposed by site staff in the course of the evaluation. D.Goodburn was requested to provide on-site assessment and advice on excavation and recording two occasions. The structures were photographed and recorded in detail on 1:10 site plans. Wood samples were collected and cleaned for examination of cut marks and identification of species. A single sample from the roundwood structure in 3815TT has been submitted for radiocarbon dating. A dendrochronology sample was taken from the plank revetment but has not been processed at this stage as the Roman date of the feature has been established by artefactual evidence.

Woven roundwood structure in Trench 3815TT

5.1.3 Trench 3815TT contained a discreet spread of roundwood located in the top of the peat, associated with small, abraded pottery sherds, thought most likely to be of Bronze Age date. The southern edge of the spread was fairly clearly defined and orientated on a more or less straight east-west line. Several small poles lay towards the eastern end, apparently crossing over each other at right angles. Initially it was unclear whether the roundwood formed a natural accumulation or was a disturbed man-made structure. Further cleaning and excavation of the southern edge suggested that it may have been the very bottom of a linear wattle-work line, with much of the wood to the north being collapsed elements of some form of upstanding woven roundwood structure, possibly a fence or fish trap wall of some kind. Radiocarbon dating of peat from the structure, and two further dates from the main body of the peat, all produced middle Bronze Age dates (the calibrated date for the structure itself is 1690-1520 cal BC at 68.2% probability - see Appendix 12).

5.1.4 Element diameters varied from 15 to 40mm and included one halved pole c. 50mm in diameter in the SE corner which appeared humanly split. One roughly axe-cut stake tip showed smooth rounded small facets, typical of Bronze Age worked roundwood. Its knotty character suggests an origin in the crown or branchwood. The other cut rod ends examined did not have any complete axe stop marks due to their small size and some abrasion. Thus it was not possible to suggest a date range on the basis of the tool marks alone, as is often the case with larger pieces of worked prehistoric roundwood and timber.

5.1.5 The spread of roundwood was somewhat ephemeral but appeared clearly defined along its south edge. It may have been a line of collapsed wattlework made from regular wood of coppiced origin. The function of the structure is unclear. Several clearly axe-cut ends,

with concave reasonably smooth, facets is a characteristic of Bronze Age cut marks (although this conflicts with artefactual evidence suggesting an Iron age date). No beaver worked wood was visible. Some parallels might exist with ephemeral wattle structures of Bronze Age date found at Rainham, a fairly short distance to the north-west.

Plank revetment in Trench 3818TT

5.1.6 Trench 3818TT contained part of a lightweight plank revetment and other fragments of worked wood, found in association with Roman artefacts and located c.30m north of Northfleet Roman Villa. A possible land surface could be seen in section on the north side of the revetment, suggesting that the structure may have revetted a Roman period channel located immediately north of the villa buildings. The east-west alignment of the plank revetment is similar to the villa complex. The revetment was a simple, low structure comprising two cleft oak stakes, with a tangentially faced, almost certainly sawn, oak plank set on edge behind them. The oak plank appears to have been split along the pith line and was probably originally almost twice as wide. However, as the stakes are widely spread and relatively modest in size it is unlikely that the structure ever stood more than two planks high (c.0.9m).

5.1.7 Such simple low revetments are relatively common in Roman contexts on tributaries of the Thames and roadside drains in the London area. Few have been found and recorded in Kent. It can be suggested that the revetment was constructed to face water on the side with the stakes, which is in agreement with the deposit sequence seen in the adjacent section. On technological grounds alone there is no reason to suggest that this structure is not Roman and this conclusion is supported by artefactual dating evidence from the surrounding deposits. As sawn timber was apparently not made in pre-Roman or early medieval Britain it is extremely unlikely to be of these periods.

Other worked wood in Trench 3818TT

5.1.8 A sparse, amorphous deposit of small roundwood, including some worked fragments of larger timber, was present at the south-western end of Trench 3818TT in a peaty silt matrix. Cut ends could be seen on some of the roundwood, and at least one large oak chip was visible. The most interesting piece was a battered fragment from a square hewn pole of a deciduous wood (species uncertain - possibly alder). The object was c. 0.4m long and 0.08m thick. Most of the surface had been cut away from a sawn cut, reducing its thickness. The recessed area was pierced by three evenly spaced pegs c. 0.03m in diameter and was stained by contact with a small iron object. The function of the object is quite unclear as pegs are not known at all from Roman structural woodwork in London, but they are known in Roman joinery, boat timbers, machinery and a variety of other objects. The object is slightly reminiscent of the cage frame found in the fort ditch of Roman Carlisle but is rather larger. Located between the south facing revetment described above and the edge of the gravel spur on which the villa is constructed, the wood is likely to be an accumulation of Roman period debris.

Conservation

5.1.9 As the structures were ephemeral and unlikely to survive reburial it was decided to record and excavate them in detail during the evaluation. Samples of worked fragments were lifted and retained for detailed recording. Given the fragmentary nature of the material it should be discarded following thorough recording.

Potential for further work

5.1.10 Prehistoric: The later prehistoric (middle Bronze Age) wattle structure is of very uncertain function and therefore in isolation is of limited value for addressing the fieldwork event aims. However, more extensive excavation in the valley bottom, particularly in the area close to the gravel high, may be expected to produce further waterlogged structures. The function and character of the structures encountered may provide an indication of environmental conditions at the time they were made, and shed light on the nature of later prehistoric wetland exploitation.

5.1.11 Roman: Although of limited intrinsic interest, the worked wood recovered sheds some light on activity on the Rivers edge immediately adjacent to the villa complex. Most importantly, the material highlights the potential of the floodplain edge to produce Roman woodwork of unpredictable quantity and type, potentially including boat, jetty and revetment remains, as well as general refuse from the villa occupation area and evidence for exploitation of wetland resources.

5.1.12 The three timbers from the Roman revetment were all cut from relatively fast-grown oak and had few rings (the stakes had c. 35 rings, the plank c.45). As the plank could just be viable for dendrochronological dating of a Roman timber from the London region, a sample was recovered for possible future dating.

APPENDIX 6 - MISCELLANEOUS ARTEFACTS

by Valerie Diez

6.1 Assessment of miscellaneous finds

Introduction and methodology

6.1.1 A total of 40 shells, 1 fragment of wall plaster, 4 fragments of floor plaster, 13 stone fragments and 1 sherd of glass were recovered by hand excavation (Table 17). They have been briefly scanned in order to establish their identification and potential.

Shell

6.1.2 A total of 40 shells were recovered. They all are oyster shells and derive from two trenches, 3807TT and 3820TT. Because of its small size, this assemblage has no potential for further analysis.

Plaster and wall plaster

6.1.3 One small piece of wall plaster was recovered. The upper surface shows traces of red paint.

6.1.4 Four large sections of plaster floor were recovered from context 3831001, the possible bathhouse of Northfleet Roman Villa. The plaster has tile impressions on the under-surface and traces of at least two colours of paint on the upper surface, possibly including a black border. The plaster was not found *in situ*. They blocks appear to have been excavated during the 1978-84 TAG excavations and left in the bathhouse trench (3831TT) when it was back-filled.

6.1.5 The wall plaster fragment has no potential for further work. The plaster floor fragments could be analysed further to establish the type of plaster and to allow detailed examination and recording of the decoration. Their potential is otherwise very limited as they were not find *in situ*.

Stone

6.1.6 A total of three worked and eight unworked fragments were recovered from various trenches. The three worked fragments are made of greensand and are probably building stones. they come from Trenches 3807TT and 3820TT, which both contained extensive evidence of Roman activity. Among the eight unworked stone fragments, six were burnt.

6.1.7 This assemblage, because of its small size, offers very little potential for further work.

Glass

6.1.8 A single fragment of glass was recovered from the site, from context 3797003. This a bulbous body fragment of green glass from a wine bottle no earlier than the 18th century, and possibly 19th or 20th century. No further work is considered necessary.

Table 17: Quantification of miscellaneous finds

Context	Special number	Material	Count	Weight (g)	Period	Comments (description)
3807003		Shell	1	21		oyster shell
3807007		Shell	6	125		oyster shells
3807008		Shell	6	81		oyster shells
3807018		Shell	1	15		oyster shell
3807026		Shell	2	7		oyster shells
3807027		Shell	3	20		oyster shells
3820004		Shell	8	88		oyster shells
3820007		Shell	2	18		oyster shells
3820013		Shell	1	86		oyster shell
3820015		Shell	7	77		oyster shells
3833004		Shell	3	54		oyster shells
Total			**40**	**592**		
3833004		wall plaster	1	15		trace of red paint
Total			***1***	***15***		
3831001	111	plaster	1			plaster floor
3831001	112	plaster	1			plaster floor
3831001	113	plaster	1			plaster floor
3831001	114	plaster	1			plaster floor
Total			**4**			
3807007		stone	1	1507		frag. of greensand partly burnt, possible building stone
3820003		stone	1	153		frag. of greensand, possible building stone
3820007		stone	1	376		frag. of cherty greensand, possible building stone
3834017		stone	4	212		burnt frag. of cherty greensand
3834017		stone	1	4		unworked frag., ironstone
3806003		stone	2	12		unworked burnt frag., tufa?
3819007		stone	3	16		small unworked pebbles of dark coloured flint, might have come from piece of Herts rudding-stone
Total			**13**	**2280**		
3797003		glass	1		Modern	green glass

APPENDIX 7 - ANIMAL BONE

by Dr. Francis Wenban-Smith

7.1 Pleistocene vertebrate remains

Introduction

7.1.1 The presence of remains of large vertebrates in Pleistocene deposits was investigated by the dry-sieving on-site of 100 litre spit samples, and by close observation during excavation of test-pits into Pleistocene sediments. The presence of the remains of small vertebrates was investigated by the taking of bulk sediment samples from potentially suitable deposits for wet-sieving off-site and subsequent examination of the residues.

Methodology

7.1.2 Spit samples of 100 litres were taken at regular intervals from Pleistocene sediments and sieved on-site through a mesh of 1cm to investigate for the presence of faunal remains (as well as lithic artefacts). Bulk sediment samples of 10-20 litres were taken from potentially suitable finer-grained sediments and sieved off-site through a graded nest of sieves of mesh-sizes 10, 4, 2, 1 and 0.5mm. The residues were dried at room temperature and then sorted for any small vertebrate remains, using a low-powered binocular microscope for the smaller size-grades of residue. 100% of all the residues greater than 2mm were sorted, 50% of residues in the size-grade 2–1mm were normally sorted, and 10% of the residues of the grade 1–0.5mm scanned.

7.1.3 When a context had been sampled by a vertical series of samples from the same context, these were not all sorted, but were sampled at regular intervals (usually alternately) to evaluate whether the context contained relevant evidence or not.

Provenance and quantification

7.1.4 No identifiable large vertebrate remains were found. The only sign of such evidence was a tiny unidentifiable fragment from sample 29 from the top of context 3790003 in 3790 TT; this was completely unidentifiable, but does however indicate the potential of the deposit to contain identifiable mammalian remains.

7.1.5 Small vertebrate material was absent in Pleistocene deposits in Zones 1, 2 and 3.

7.1.6 In Zone 4 (Gravel spur), small vertebrate molars and incisors (rodent, including possibly lemming) were present in the Late Pleistocene? colluvial/solifluction deposits (sands) that constituted the majority of the sequence in 3834TT and 3835TT (Table 18). These were reasonably well-preserved although moderately scarce in sample 107/108 from the middle of the sands (3835008) in 3835TT, and scarce and moderately poorly preserved in sample 59 from the very base of the sands (3834003) in 3834TT. No evidence was found of larger vertebrates

Conservation

7.1.7 There are no conservation implications for the small vertebrate remains, as long as they are kept dry and at room temperature.

Comparative material

7.1.8 Small vertebrate remains are abundant in other Middle/Late Pleistocene sediments investigated in the Ebbsfleet Valley (Wenban-Smith 1995) and in the Lower Thames region, for instance at Crayford and Purfleet. Recovery and analysis of a larger sample from the sediments in the gravel spur area could enable their chronological relationship to other small-vertebrate bearing sediments to be clarified.

Potential for further work

7.1.9 Having established the presence of small vertebrate remains in certain deposits (Pleistocene sands in 3834TT and 3835TT; Holocene clay-silty alluvium in 3795TT), these sediments need to be more thoroughly sampled from top to bottom to clarify the changing environment and mode of formation of the sediment, and to recover a larger sample for biostratigraphic dating and palaeo-environmental reconstruction.

7.1.10 In view of the uncertainty over the location of sample 18 in 3795TT which contained the small vertebrate remains, as explained in the trench summary in Appendix 1, it would be sensible to re-sample all the fine-grained sediments above the basal gravels (context 3795007).

Table 18: Small vertebrate recovery and sampling

Zone	Trench	Context	Sample	Prevalence	Condition	Description, notes
/ Unsorted sample, – None/condition not applicable, + Sparse/poorly preserved, * Moderately common/occasionally well-preserved, generally poor, ** Abundant, common/generally well-preserved						
1	3782TT	3782007	27	–	–	–
		3782009	13	–	–	–
	3787TT	3787003	50	–	–	–
		3787009	51	–	–	–
			52	–	–	–
	3789TT	3789011	63	–	–	–
		3789012	64	–	–	–
			68	–	–	–
		3789013	65	–	–	–
		3789014	69	–	–	–
		3789015	66	–	–	–
			70	–	–	–
	3790TT	3790003	29	–	–	–
			30	–	–	–
			31	/	/	/
			32	–	–	–
			33	/	/	/
			34	–	–	–
			35	/	/	/
			36	–	–	–
		3790004	26	–	–	–
		3790005	21	–	–	–
			22	/	/	/
		3790006	23	/	/	/
			24	–	–	–
			25	/	/	/
			28	–	–	–
2	3805TT	3805007	74	–	–	–

Zone	Trench	Context	Sample	Prevalence	Condition	Description, notes
/ Unsorted sample, – None/condition not applicable, + Sparse/poorly preserved, * Moderately common/occasionally well-preserved, generally poor, ** Abundant, common/generally well-preserved						
		3805008	75	–	–	–
		3805009	76	–	–	–
		3805010	77	–	–	–
		3805011	79	–	–	–
			80	–	–	–
			81	–	–	–
	3807TT	3807059	105	–	–	–
	3808TT	3808005	1	–	–	–
			2	–	–	–
	3829ATT	3829002	145	–	–	–
		3829003	146	–	–	–
			147	–	–	–
3	3795TT	3795005	17	–	–	–
	3797TT	3795006	18	*	*	Post-cranial material, probably from an amphibian such as a frog or toad.
		3797013	47	–	–	–
4	3830TT	3830008	73	–	–	–
		3830010	71	–	–	–
			72	–	–	–
	3833TT	3833011	60	–	–	–
	3834TT	3834003	56	–	–	–
			57	–	–	–
			58	–	–	–
			59	+	*	Post-cranial pieces plus two molar frag's
	3835TT	3835008	107/108	**	**	Includes molar, maxilla fragment and two (matching?) incisors - from one individual?
			109	–	–	–

7.2 Holocene (Prehistoric and Roman) Animal Bone

Bethan Charles

Introduction

7.2.1 Only a small assemblage of animal bone was recovered by hand. The material has been fully recorded and can be found in the archive. No additional material was recovered from environmental samples. However, the majority of the samples taken from the site were small (being from waterlogged deposits) and therefore not conducive to the recovery of animal bone.

7.2.2 The material was recovered in order to address the Fieldwork Event Aims concerned with the prehistoric and Roman palaeoeconomy.

Methodology

7.2.3 The percentages of species were calculated using the total fragment method. All fragments of bone were counted including elements from the vertebral centrum, ribs, long bone shafts as well as individual teeth. The minimum number of individuals (MNI) was not calculated due to the small number of identified elements recovered from the main domestic species.

7.2.4 The sheep and goat bones were separated using the criteria of Boessneck (1969), Prummel and Frisch (1986), in addition to the use of the reference material housed at the OAU.

7.2.5 The ageing of the animals was based on tooth eruption and wear as well as the epiphyseal fusion rates of the long bones. Silver's (1969) tables were used to give timing of epiphyseal closure for cattle, sheep, pigs and horses. Cattle tooth eruption and wear was measured using Halstead (1985) and Grants (1982) tables. Horse tooth eruption and wear was measured using Levine's (1982) tables. All tooth eruption and wear tables can be found in the archive

7.2.6 Sex determination has not been carried out due to lack of indicative elements in the assemblage.

7.2.7 The measurements taken were those defined by von den Driesch (1976).

Quantification

7.2.8 A total of 125 (9057g) fragments of bone were recovered by hand from the site. From this number 76 (8107g) fragments were identified to species (just over 60% of the total number of fragments recovered) as seen in Table 19.

Condition

7.2.9 Over 95% the bone from the site was in very good condition with very few new breaks as a result of excavation. None of the bones had evidence of burning or tooth gnaw marks.

Provenance

7.2.10 The majority of the bone came from Roman contexts in 3807TT, 3820TT and 3834TT.

Prehistoric

7.2.11 Only seven fragments of identified bone were assigned to possible prehistoric deposits, all within Zone 3 (the Valley Bottom). These included a horse mandible and radius and a cattle scapula and tibia from context 3793006 as well as a cattle rib from context 3814004, a domestic fowl tarsometatarsus with spur from context 3815013 and another cattle rib with 7 clear knife marks from context 3815015.

7.2.12 The dating of these contexts is at present uncertain. It is unlikely that the domestic fowl bone came from deposits older than Iron Age/Roman date.

7.2.13 Both the horse mandible and domestic fowl tarsometatarsus had clear signs of pathological changes. The horse mandible had perforations around the root area of and there was a lot of bone formation. It is likely that this was as a result of abscesses around the jaw that were in the process of healing. The domestic fowl tarsometatarsus also had a lot of bone formation around the mid section. It is possible that this was as a result of a fracture.

7.2.14 Small vertebrate material (probably amphibian, although pending full identification) was present in bulk sample 18 from the alluvial clay-silt (3795006) in 3795 TT.

Roman

7.2.15 95 (7167g) fragments of bone were recovered from Roman deposits in Zones 2 and 4, of which 60% were identified to species. Elements from cattle bones were the most numerous fragments retrieved (77% of the identified fragments). The elements recovered were quite mixed with fragments of butchery waste such as skull fragments, foot bones, ribs and vertebrae as well as a variety of long bone fragments.

7.2.16 The remaining fragments in almost equal numbers belonged to pig, sheep, horse, red deer and dog. None of the bones had butchery marks. However, the horse and dog bones were more complete than those of the domestic species.

7.2.17 Two fragments of bone belonging to Aurochs were also found within Roman deposits from context 3807048. As there is no evidence that Aurochs survived in Britain after the Bronze Age it is likely that this deposit included redeposited material from earlier periods of occupation.

Table 19: Percentage of identifiable animal bone per context

Context	Period	% of identified fragments							Count	Weight (g)
		Sheep/ goat	Cattle	Pig	Horse	Dog	Bird	Other		
3793006	Prehistoric	0	50	0	50	0	0	0	4	1417
3807003	Roman	0	80	0	0	20	0	0	5	424
3807018	Roman	0	100	0	0	0	0	0	2	175
3807031	Roman	0	0	100	0	0	0	0	1	40
3807048	Roman	0	0	0	0	0	0	100	2	651
3807049	Roman	0	100	0	0	0	0	0	2	143
3807053	Roman	0	0	0	100	0	0	0	1	216
3814004	Prehistoric	0	100	0	0	0	0	0	1	7
3815013	Prehistoric	0	0	0	0	0	100	0	1	6

Context	Period	% of identified fragments							Count	Weight (g)
		Sheep/ goat	Cattle	Pig	Horse	Dog	Bird	Other		
3815015	Prehistoric	0	100	0	0	0	0	0	1	38
3816005	Undated	0	100	0	0	0	0	0	2	102
3818025	Roman	0	80	0	0	10	0	10	10	2090
3819007	Roman	0	86	0	14	0	0	0	7	1515
3820005	Roman	0	100	0	0	0	0	0	1	205
3820007	Roman	0	100	0	0	0	0	0	1	63
3820015	Roman	17	83	0	0	0	0	0	6	62
3828004	Undated	0	100	0	0	0	0	0	5	93
3833013	Roman	0	0	0	0	0	0	100	1	9
3834005	Roman	0	0	0	100	0	0	0	1	397
3834014	Roman	0	25	50	0	0	0	25	4	48
3834019	Roman	33.3	66.6	0	0	0	0	0	3	72
3834021	Roman	0	100	0	0	0	0	0	1	55
3835002	Roman	0	100	0	0	0	0	0	8	64
3837005	Undated	0	100	0	0	0	0	0	6	215
Total									**76**	**8107**

Conservation

7.2.18 Storage of the animal bone in finds boxes in a dry environment is satisfactory for long term storage. No specific conservation measures are required.

Potential for further work

7.2.19 The assemblage is too small to contribute significantly to the fieldwork aims. However, when combined with material from previous and possible future investigations, the assemblage will provide useful additional information. The good condition of the bone indicates high potential for larger scale excavation to recover bone in useful quantities. Although the assemblage from this site is small it does merit further work to enable a better understanding of the economy of the site during the Prehistoric and Roman periods of occupation as well as providing comparative data for any further excavations in the area.

7.2.20 Many of the bones from the site have been measured. It would be of value to compare this data with that from other site of the period both regionally and nationally. It would also be of value to assess more thoroughly the ages of the animals killed at the site in addition to a more detailed report on the pathological features on two of the bones.

APPENDIX 8 - INSECTS

Mark Robinson

8.1 Assessment of Holocene Insects

Method

8.1.1 The assessment of insects is based on two sequences through the general alluvial and peat sequences (Trenches 3809TT and 3815TT) and one sequence through the deposits in the area of Roman activity (Trench 3818TT). Nineteen samples were assessed. Sub-samples of 2kg were washed over onto a 0.25mm mesh, subjected to paraffin flotation, the flots washed in detergent and scanned under a binocular microscope. The results for insects are recorded in Table 20, nomenclature for Coleoptera following Kloet and Hincks (1977).

8.1.2 In addition to the insects, shells of the aquatic molluscs *Lymnaea palustris* and *Gyraulus albus* were noted in Sample 185, context 3815003.

Assessment results and interpretation

8.1.3 Trench 3809: Insect remains are entirely absent from the peat sequence itself (Samples 140-144). These deposits contain much decayed woody debris, including roots. However, well-preserved remains are present in Sample 139 (Context 011) at the interface of the underlying clay with the peat. They comprise insects, mostly beetles, of two main habitats: swamp and oak / hazel woodland. The swamp insects include aquatic beetles of small pools of water, such as *Ochthebius* cf. *minimus*, *Hydrobius fuscipes* and *Hydraena testacea*. There are also phytophagous beetles which feed on aquatic plants, with *Tanysphyrus lemnae* which feeds on *Lemna* sp. (duckweed), *Prasocuris phellandrii* which feeds on aquatic Umbelliferae such as *Oenanthe aquatica* (water dropwort) and *Plateumaris sericea* which feeds on Cyperaceae, such as *Carex* spp. (sedges). Marshy ground is suggested by the beetle *Elaphrus* sp.

8.1.4 Woodland is suggested by *Aplocnemus nigricornis* which occur under bark, *Curculio nucum* which develops in the nuts of *Corylus avellana* (hazel) and by galls formed on *Quercus* sp. (oak) by the gall wasps *Cynips* sp. and *Neuroterus* sp. A hint of a more open grassy area is given by the elaterid beetle *Athous haemorrhoidalis*.

8.1.5 The sequence possibly represents an area of oak / hazel woodland being inundated by a rising water table.

8.1.6 Trench 3815TT: Insects are absent or badly preserved in the samples from this sequence (Samples 185-194). Only Sample 188 (Context 006) contains sufficient remains for interpretation. Small water beetles from the genera *Helophorus* and *Ochthebius* predominate. Other aquatic insects include larvae of Trichoptera (caddis flies). Aquatic vegetation is suggested by *Donacia* or *Plateumaris* sp. The insect remains suggest the deposit accumulated in a swamp or marsh with pools of water, but little further interpretation is possible.

8.1.7 Trench 3818TT: Insects are absent from Samples 195 and 198 but very poorly preserved in Sample 197 (Context 039). There are a few insects of stagnant water, such as the beetle *Hydrobius fuscipes*. There are also a couple of beetles from grassland

habitats, the chafer beetle *Phyllopertha horticola* and a scarabaeid dung beetle *Aphodius* sp. These two beetles would be appropriate to pastureland at the Roman settlement.

Potential for further work

8.1.8 The only sample with potential for further analysis is Sample 139 from Trench 3809TT, Context 011. The poor preservation and low concentration of insects in the other samples which contain insect remains render them unsuitable for detailed analysis. The insects in Sample 139 have the potential to provide much information on the woodland in the valley bottom when it was becoming waterlogged, including whether or not an "old woodland" fauna was present. It is possible that there would also be evidence for Neolithic activity. However, before any further work is done on the sample, it would be necessary to undertaken radiocarbon dating of it. Even then, it would still be an isolated sample unrelated to any known archaeology. At present it is recommended that Sample 139 be retained in case it can be used in part of a wider study of environmental change in the Ebbsfleet Valley, but it is not necessary to retain the other insect samples.

Table 20: Waterlogged insect remains

	Sample	139	186	188	191	197
	Trench	3809	3185	3815	3815	3818
	Context	011	004	006	009	039
	Weight (kg)	2	2	2	2	2
COLEOPTERA						
Elaphrus sp.		+	-	-	-	-
Agonum sp.		+	-	-	-	-
Helophorus sp. (*brevipalpis* size)		-	-	++	-	-
Hydrobius fuscipes		+	-	-	-	+
Laccobius sp.		+	-	-	-	-
Ochthebius cf. *Minimus*		++	-	-	-	-
Ochthebius sp.		-	-	++	+	+
Hydraena testacea		+	-	-	-	-
Hydraena sp.		-	-	+	-	-
Limnebius aluata		+	-	-	-	-
Ptenidium sp.		-	-	+	-	+
Silpha atrata		-	-	+	-	-
Carpelimus sp.		-	-	+	-	-
Stenus sp.		+	-	-	-	-
Pselaphidae indet.		+	-	-	-	-
Aphodius sp.		-	-	-	-	+
Phyllopertha horticola		-	-	-	-	+
cf. *Cyphon*		+	-	-	-	-
Athous haemorrhoidalis		+	-	-	-	-
Aplocnemus nigricornis		+	-	-	-	-
Plateumaris cf. *Sericea*		+	-	-	-	-
Donacia or *Plateumaris* sp.		+	-	+	-	-
Prasocuris phellandrii		+	-	-	-	-
Tanysphyrus lemnae		+	-	-	-	-
Curculio nucum		+	-	-	-	-
Rhynchaenus sp. (not *pratensis*)		+	-	-	-	-
OTHER INSECTS						
Pentatoma rufipes		+	-	-	-	-
Trichoptera indet.	- larva	+	-	+	-	-
Trichoptera indet.	- larval case	-	+	-	-	-
cf. *Cynips* sp.	- gall	+	-	-	-	-
Neuroterus sp.	- gall	+	-	-	-	-
Hymenoptera indet.		+	-	+	-	+

+ present, ++ common

APPENDIX 9 - MOLLUSCS

by Dr. Francis Wenban-Smith & Dr. Mark Robinson

9.1 Pleistocene molluscs

Introduction

9.1.1 The presence of the remains of molluscs was investigated by the taking of bulk sediment samples from potentially suitable deposits for wet-sieving off-site and subsequent examination of the residues. In most cases the presence of molluscs was established by direct observation in the field, although sometimes what was thought to be Pleistocene molluscs turned out to be derived Tertiary fragments, which are abundant in some Ebbsfleet Valley sediments.

Methodology

9.1.2 Bulk sediment samples of 10-20 litres were taken from potentially suitable finer-grained sediments and sieved off-site through a graded nest of sieves of mesh-sizes 10, 4, 2, 1 and 0.5mm. The residues were dried at room temperature and then sorted for any molluscan remains, using a low-powered binocular microscope for the smaller size-grades of residue. 100% of all the residues greater than 2mm were sorted, 50% of residues in the size-grade 2–1mm were normally sorted, and 10% of the residues of the grade 1–0.5mm scanned.

9.1.3 When a context had been sampled by a vertical series of samples from the same context, these were not all sorted, but were sampled at regular intervals (usually alternately) to evaluate whether the context contained relevant evidence or not.

Provenance and quantification

9.1.4 The details of the presence of molluscs in Pleistocene sediments are given in Table 17. In summary, fine-grained Pleistocene deposits, probably of fluvial origin, containing both freshwater and terrestrial molluscs are present in Zone 1 (Valley-side N) in 3787TT, 3789TT and 3790TT. No molluscan evidence was found in the Pleistocene sediments of Zone 2 (Valley-side S) or Zone 3 (Valley-bottom). In Zone 4 (Gravel spur), Molluscs, including fairly frequent *Pupilla muscorum*, were present in deposits probably of colluvial/solifluction origin in 3830TT, 3833TT, 3834TT and 3835TT . Full interpretation of the nature of the sediments containing molluscs, their date of formation, and the environment and climate accompanying their deposition can only be made after further analysis and amino acid dating of the molluscs.

Conservation

9.1.5 There are no conservation implications for the molluscan remains, as long as they are kept dry and at room temperature.

Comparative material

9.1.6 Pleistocene molluscan remains are abundant in other parts of the Ebbsfleet Valley and in the Lower Thames region.

Potential for further work

9.1.7 A consecutive vertical series of samples needs to be taken through deposits shown to contain molluscan evidence. This will help in palaeo-environmental and climatic reconstruction, and identification of the mode of formation of sediments.

9.1.8 Molluscs from the mollusc-bearing sediments can also be used for amino acid dating. This technique is sufficient to distinguish Holocene from Pleistocene sediments, and sediments from different Oxygen Isotope Stages of the Pleistocene from each other. In view of the great uncertainty following the evaluation of whether certain sediments are Pleistocene or Holocene, and to which stage of the Pleistocene certain sediments belong, there is great potential for the application of amino acid dating to those sediments containing molluscan fauna. Two of the species which are most common in the sediments (Pupilla muscorum and Trichia hispida) have been used for amino acid dating of other sites in the Lower Thames region, providing a good comparative framework for application of the technique.

Table 21: Molluscan recovery and sampling

Zone	Trench	Context	Sample	Prevalence	Condition	Description, notes
(/ Unsorted sample, – None/condition not applicable, + Sparse/poorly preserved, * Moderately common/occasionally well-preserved, generally poor, ** Abundant, common/generally well-preserved)						
1	3782	3782007	27	–	–	–
		3782009	13	–	–	–
	3787	3787003	50	**	**	Mostly *Trichia hisp.*
		3787009	51	*	**	Several species
			52	*	+	Frag's, none IDable, some prob. Tertiary derived
	3789	3789011	63	–	–	–
		3789012	64	–	–	–
			68	–	–	–
		3789013	65	**	**	Abundant and diverse molluscan fauna, including freq. *Bithynia* operc. and occ. *Pup. m*
		3789014	69	–	–	–
		3789015	66	+	+	Very occasional derived and unidentifiable frag's
			70	–	–	–
	3790	3790003	29	**	**	Abundant and diverse molluscan fauna
			30	**	**	Abundant and diverse molluscan fauna, including *Bithynia* operc. and *Trichia hisp.*
			31	/	/	/
			32	**	**	Abundant and diverse molluscan fauna, including *Bithynia* operc. and *Trichia hisp.*
			33	/	/	/
			34	+	**	Fairly sparse molluscan fauna, including *Trichia hisp.*

Zone	Trench	Context	Sample	Prevalence	Condition	Description, notes
(/ Unsorted sample, – None/condition not applicable, + Sparse/poorly preserved, * Moderately common/occasionally well-preserved, generally poor, ** Abundant, common/generally well-preserved)						
			35	/	/	/
			36	–	–	–
		3790004	26	–	–	–
		3790005	21	–	–	–
			22	/	/	/
		3790006	23	/	/	/
			24	–	–	–
			25	/	/	/
			28	–	–	–
2	3805	3805007	74	–	–	–
		3805008	75	–	–	–
		3805009	76	–	–	–
		3805010	77	–	–	–
		3805011	79	–	–	–
			80	–	–	–
			81	–	–	–
	3807	3807059	105	–	–	–
	3808	3808005	1	–	–	–
			2	–	–	–
	3829A	3829002	145	–	–	–
		3829003	146	–	–	–
			147	–	–	–
3	3795	3795005	17	+	*	Fairly sparse molluscan fauna, including *Trichia hisp.*
		3795006	18	*	**	Moderately freq. molluscan fauna, including *Trichia hisp.*
	3797	3797013	47	–	–	–
4	3830	3830008	73	–	–	–
		3830010	71	–	–	–
			72	+	**	Occ. *Pup. musc.*
	3833	3833011	60	*	**	All *Pup. musc.*
	3834	3834003	56	+	*	Single Bithynia operculum - prob. derived
			57	–	–	–
			58	–	–	–
			59	+	*	Occ. *Pup. musc.*
	3835	3835008	107/108	**	**	At least two species, inc. *Pup. musc.*
			109	**	**	At least two species, inc. *Pup. musc.*

9.2 Holocene molluscs

In Zone 1 (Valley-side N), molluscs were present at the base of the Holocene colluvium in 3787TT, and in the Holocene alluvial sequence in 3785TT. In Zone 2 (Valley-side S), no

molluscs were seen in any of the superficial colluvial sediments which constitute the Holocene deposition in this part of the site. Molluscs were abundant throughout the Holocene fluvial and alluvial sediments and peats in Zone 3 (Valley-bottom). In Zone 4 (Gravel spur), no molluscs were seen in any of the superficial colluvial sediments that constitute the Holocene deposition in this part of the site.

APPENDIX 10 - MACROSCOPIC PLANT REMAINS

10.1 Assessment of Holocene charred and waterlogged plant remains

Ruth Pelling

Introduction

10.1.1 Three Holocene alluvial sequences were examined to assess the potential of the waterlogged plant remains to address the Fieldwork Event Aims. The sequences were selected because they can be directly related to archaeological remains, and because they are thought to be representative of the Holocene open channel and marsh sequences recorded in the valley bottom.

Method

10.1.2 Sub-samples of 200g were processed using a simple wash over technique and both flots and residues were collected onto 250μm mesh sieves. The flots were kept wet and submitted to the Oxford University Museum of Natural History for assessment. Assessment was conducted by scanning the flots under a binocular microscope at x10 to x20 magnification. Any waterlogged seeds or other items were provisionally identified and an approximation of abundance was made. Quantification was on a three-point scale (+ = present, ++ = common, +++ = abundant). Any charred items noted was also identified and quantified. Nomenclature and taxonomic order follows Clapham, Tutin and Moore (1989).

Provenance

10.1.3 Three key Holocene alluvial sequences (3809TT, 3815TT, 3818TT) have been selected for detailed geoarchaeological assessment and for assessment of waterlogged plant remains (Table 22). Two of those sequences have also been assessed for pollen (3815TT, 3818TT).

Results

10.1.4 A sequence of five samples was examined from Trench 3809TT. The upper four deposits produced poorly preserved wood fragments and roots but no seeds or chaff (these samples are not included in the tables). The lower deposit, sample 139 (context 3809011) also contained wood fragments, but in addition contained remains of unidentifiable leaf fragments and buds, *Quercus* sp. seeds (acorns), *Corylus avellana* (hazel) nut and catkins. Occasional seeds included those of wet or marshy ground such as *Ranunculus acris/repens/bulbosus* (buttercup), *Carex* sp. (sedges) and *Glycera* sp. (sweet-grass), an aquatic grass, usually of slow flowing muddy water or marshy conditions.

10.1.5 Ten samples were examined from Trench 3815TT. The flots tended to consist largely of roots and reed stem fragments. Seeds of *Schoenoplectus* sp. (club-rush), *Eleocharis palustris* (common spike rush), *Ranunculus sceleratus* (celery-leaved crowfoot) and *Ranunculus* subgen *Batrachium* (crowfoot) were most frequently noted, all of which would have been growing in shallow muddy water and/or marshes. *Lycopyus europeus* will also have been growing within the shallow muddy water, while *Carex* sp., *Ranunculus acris/repends/bulbosus* and *Potentilla anserina* further indicate damp or

marshy ground. *Rubus fruticosus* (blackberry/bramble) and *Sambucus nigra* (elderberry) may have been growing in a slightly drier ground environment.

10.1.6 One sample was examined from Trench 3818TT. This deposit was associated with a number of Roman archaeological finds. Charred remains of *Triticum spelta* (spelt wheat) glume bases and *Bromus* subsect *Eubromus* (brome grass) seeds were recovered. Waterlogged seeds from this deposit included the marshy ground or river edge plants, *Scheonoplectus* sp. and *Carex* sp. but also included *Urtica dioica* (stinging nettle) which is characteristic of drier, nitrogen rich ruderal deposits.

10.1.7 In summary, the plant remains recovered from Trench 3809TT suggest that oak woodland was present in the area, until swamped by a rising water table, while reed swamp/river edge vegetation was recovered from the other trenches. Trench 3818TT produced evidence for Roman period crop processing waste in the form of spelt wheat glume bases from context 3818039.

Interpretation and potential for further work

10.1.8 The macroscopic plant remains provide some evidence to characterise the sediments from which the sample sequences were taken. The lower deposit from Trench 3809TT is characteristic of oak woodland leaf litter with encroaching wet or marshy ground. This suggests that early Holocene, possibly Neolithic, oak woodland, and hence dry ground, was present in the area, and was swamped by a rising water table. This in turn raises the potential for early Holocene archaeology below the peats. The sequence sampled from Trench 3815TT produced a flora more characteristic of shallow nutrient rich muddy water or marshes. There is no evidence for a phase of alder fen in any of the trenches. Sample 197 from context 3818039 produced evidence of cereal processing waste presumably associated with the Roman archaeological evidence recovered during the evaluation. Spelt wheat is the typical wheat of the Roman period. The waterlogged seeds in this sample include species probably growing within the settlement (*Urtica dioica*). Without more substantial excavation and sampling of the associated archaeological deposits there is little potential for any analysis of charred remains. Processing of larger samples for waterlogged remains might extend the species list although it is thought unlikely that it will provide any additional habitat information or characterise the deposits further. No more analysis is recommended for the present samples although time should be allowed to incorporate the assessment results into any final report.

Table 22: Density of waterlogged seeds and chaff per sample

		Sample	139	185	186	187	188	189	190	191	192	193	194	197
		Trench	3809	3815	3815	3815	3815	3815	3815	3815	3815	3815	3815	3818
		Context	011	003	004	005	006	007	008	009	010	011	016	039
		Weight (g)	200	200	200	200	200	200	200	200	200	200	200	200
Waterlogged Seeds														
Ranunculus acris/repens/bulbosus	Buttercup		+	+	-	-	-	+	-	-	-	-	-	-
Ranunculus sceleratus	Celery-leaved Crowfoot		-	-	+	-	+++	+	-	-	-	-	-	+
Ranunculus subgen *Batrachium*	Crowfoot		-	+	-	+	+	++	+	-	-	-	-	-
Stellaria media agg.	Chickweed		+	-	-	-	-	-	-	-	-	-	-	-
Rubus fruticosus	Blackberry/Bramble		+	+	-	-	-	-	-	-	+	-	+	-
Potentilla anserina	Silverweed		-	+	-	-	-	-	-	+	-	-	-	+
Urtica dioica	Stinging Nettle		-	-	-	-	-	-	-	-	-	-	-	+
Corylus avellana	Hazel, catkin		+	-	-	-	-	-	-	-	-	-	-	-
Corylus avellana	Hazel, nut		+	-	-	-	-	-	-	-	-	-	-	-
Quercus sp.	Oak, acorn		++	-	-	-	-	-	-	-	-	-	-	-
Lycopus europaeus	Gipsywort		-	-	-	-	-	-	-	-	+	-	-	-
Labiate sp.	Labiate, small seeded		-	+	-	-	-	-	-	-	-	-	-	-
Sambucus nigra	Elderberry		-	-	+	-	-	+	-	-	-	-	-	-
Eleocharis palustris	Common Spike-rush		-	-	+	+	-	+	-	++	+	-	-	-
Schoenoplectus sp.	Club-rush		-	-	++	+	+	-	+	+	+	-	-	+
Carex sp.	Rushes		+	++	-	-	-	-	+	-	-	+	-	+
Glyceria sp.	Sweet-grass		++	-	-	-	-	-	-	-	-	-	-	-
Indet	Tree bud		+++	-	-	-	-	-	-	-	-	-	-	-
Indet	Leaf fragments		++	-	-	-	-	-	-	-	-	-	-	-
Charred Remains														
Triticum spelta	Spelta wheat glume base			-	-	-	-	-	-	-	-	-	-	2
Bromus subsect *Eubromus*	Brome grass			-	-	-	-	-	-	-	-	-	-	4

(+ = present, ++ = common, +++ = abundant)

APPENDIX 11 - POLLEN

Andrew Haggart

11.1 Assessment of Holocene pollen

Introduction

11.1.1 Forty-four samples from five monoliths, 126, 174, 175, 203-1 and 203-2 were made available for palynological sampling and assessment (Tables 20-24).

Methodology

11.1.2 The samples were prepared using standard pollen extraction techniques. Prior to chemical treatment $2cm^3$ of fresh sediment was measured by volumetric displacement in distilled water and a known number of exotic *Lycopodium* spores in tablet form were added allowing pollen concentration values to be derived (Stockmarr 1971). The samples were placed in test tubes, centrifuged at 2500 rpm and the supernatant liquid decanted. Calgon was added to aid deflocculation and they were placed in a sonic bath overnight. Physical separation of the >180 μm and <10μm fraction was performed using wet sieving techniques. The samples were then mixed with a non-toxic heavy liquid, Sodium polytungstate, made up to a specific gravity of 1.95. At this specific gravity, most of the organic fraction (including pollen) floats and the majority of the mineral component sinks, enabling separation. This procedure reduces degradation of pollen grains during their extraction from mineral sediments and represents a significant and safer advance on the use of Hydrofluoric acid to digest the mineral fraction. Following separation, the samples were subjected to standard acetolysis procedures to remove cellulose (Erdtman 1960), then stained with safranine and mounted on slides using glycerol jelly.

11.1.3 Pollen grains were identified using an Olympus BX40 microscope at a magnification of 400x with critical identifications being made at 1000x magnification with phase contrast. The slides were systematically scanned initially either to 100 total land pollen (TLP) or 5 traverses, reduced to 1 traverse per slide for assessment purposes. Pollen identifications were made using Moore, Webb and Collinson (1991), Reille (1992) and the reference type slide collection at the University of Greenwich. Nomenclature follows Bennett (1994) and Bennett, Whittington and Edwards (1994).

Provenance and quantification

11.1.4 Monolith 126: Pollen concentration and preservation is good in all but the sample from the lower red-brown clay silt where the pollen abundance was low and preservation poor (Table 25). Of the taxa that were encountered, most were of the more robust types. This, together with the good preservation of the introduced *Lycopodium* spores, suggests post-depositional removal of pollen, perhaps through oxidation.

11.1.5 The tree pollen content of the lower two samples within the overlying grey-brown clay, reaches about 30% TLP and is dominated by *Alnus glutinosa* and *Quercus* with *Tilia cordata*, *Pinus sylvestris*, *Betula* and *Fraxinus excelsior* also present. The herbs, averaging about 60% TLP, are best represented by Poaceae, though with

persistent representation of other taxa in the Lactuceae, Plantaginaceae and Chenopodiaceae families. *Filipendula* and *Sanguisorba minor* pollen may suggest a damp grassland environment whilst *Potamogeton natans*-type and *Typha latifolia* may indicate slightly wetter conditions in the vicinity. The presence of Chenopodiaceae and *Armeria maritima* probably suggests a coastal influence. Also of note is the occurrence of Avena-type pollen which includes both *Avena* (oats) and *Triticum* (wheat) species.

11.1.6 The upper two samples within the grey-brown clay silts show a decrease in tree pollen to about 12% with a concomitant increase in herbs to over 80% TLP. This rise is caused in part by an increase in Cyperaceae pollen, which may suggest an increase in wet marshy conditions. This is supported by the presence of *Persicaria maculosa*-type pollen, most members of which are species with affinities for damp grassland, ditches or ponds - though *P. maculosa* itself is a native of waste, cultivated and open ground (Stace, 1993). Again the presence of *Avena*-type pollen probably suggests cereal cultivation in the vicinity.

11.1.7 The upper sample is still dominated by herbs including Poaceae at 25% TLP though there is an increase in *Alnus glutinosa* and *Corylus avellana*-type to 15% and 14% TLP respectively.

11.1.8 Monolith 174: The lower three counts through the grey-brown clay silt with red mottling again show signs of post-depositional alteration perhaps through oxidation for the same reasons quoted above (Table 26).

11.1.9 The remaining levels have good, if not very good, pollen concentration and preservation. The highest representation of tree pollen is at 55-56cm within the grey-black organic clay silt, where it reaches about 20% TLP. The levels above the barren basal unit are dominated throughout by grass pollen. This, together with species such as *Polygonum* and *Lythrum salicaria* type probably suggests a damp grassy marshland environment. Above 55-56cm there is an increase in the representation of Cyperaceae pollen which might indicate increasing wetness, a suggestion supported by the rise in aquatic pollen towards the top of the sequence.

11.1.10 However, within the upper two sandy silt units there are also indications of cereal cultivation suggested by *Avena*-type pollen and the presence of *Centaurea cyanus* (cornflower) pollen.

11.1.11 Throughout there are also other weeds such as *Malva sylvestris*-type and perhaps *Dipsacus* that suggest waste and rough ground in the vicinity of the site. The former species has been considered to be strongly associated with human activity and has been recorded in the British Isles since Roman times (Godwin 1975).

11.1.12 Monolith 175: Only one traverse per sample was counted through this monolith and this is reflected by lower total counts and a reduced species list (Table 27). Nevertheless the pollen preservation and concentration was found to be acceptable in all levels save one from the uppermost unit of made ground.

11.1.13 Up to 79-80cm tree pollen averages 43% and herb pollen 40% TLP. However above this level tree pollen declines to an average 23% whilst herbs rise to average 74% TLP, albeit on lower total counts. In the lower section the main tree pollen types are *Quercus* with *Alnus glutinosa* and *Pinus sylvestris*, *Betula*, *Fagus sylvatica* and *Tilia cordata* also present. The herbs are dominated by Poaceae and Cyperaceae throughout but there is no unequivocal evidence for cultivation.

11.1.14 Monolith 203-1: Again, pollen preservation and concentration were acceptable save for the lowermost sample which contained large amounts of organic material and little pollen content (Table 23). The succeeding levels show a gradual decrease in herb pollen and an increase in tree pollen percentage representation as the organic clay is reached and this trend continues into the overlying grey clay silt. The upper red-brown clay silt sees a reverse of this trend with herbs expanding to over 80% TLP, largely due to an increase in Cyperaceae pollen. Within this sample two occurrences of *Diploneis interrupta* were noted, a diatom species common in brackish upper saltmarsh environments. Again there are indications of cereal cultivation in the vicinity with grains attributed to *Avena*-type within the lower grey clay silt.

11.1.15 Monolith 203-2: The lowermost sample within the black woody peat was very poor in pollen, though rich in organic content. The paucity of pollen but presence of introduced Lycopodium suggests post-depositional loss of pollen perhaps through desiccation and oxidation, though this will have to be proved by higher counts. The second sample from within the peat is, by contrast, abundant in pollen which is dominated by Poaceae and Cyperaceae. Aquatic pollen including Menyanthes trifoliata, Nymphaea alba, Alisma-type and Potamogeton natans-type suggests the surface of the peat was quite wet with pools of standing water (Table 24). This contrast with the lower level suggests a rising ground water table, perhaps associated with rising sea levels in the Thames estuary at this time (Sidell et al 2000).

11.1.16 The main trend within the organic rich silt is for tree pollen percentage representation to fall from 53 to 6% TLP and herb pollen to rise from 40% to 90% TLP albeit on low total counts. *Corylus avellana*-type has an important presence within this unit rising to 21% TLP at 30-31cm before declining.

11.1.17 Avena-type pollen was also noted at 65-66cm and 30-31cm.

Conclusions

11.1.18 Most of the samples counted save for those in made ground, oxidized mineral layers and dry, desiccated peat contained often abundant and generally well preserved pollen. Broad scale environmental changes can already be identified, such as the environmental changes associated with rising groundwater in Monolith 203-1 and all monoliths save M175 from the ?Roman channel contained evidence of possible cereal cultivation.

Table 23: Pollen from monolith 203-1

Monolith 203-1: Trench 3815TT (through floodplain fines above BA brushwood structure)							
	5-6	15-16	25-26	40-41	50-51	60-61	68-69
	Cm	cm	cm	cm	cm	cm	cm
Trees							
Pinus sylvestris	0	1	0	1	2	3	0
Ulmus	0	0	0	1	1	1	0
Fagus sylvatica	1	0	0	0	0	0	0
Quercus	1	3	5	4	8	4	0
Betula	0	0	1	0	1	0	0
Alnus glutinosa	0	0	3	2	0	0	1
Tilia cordata	1	0	0	0	0	0	0
Shrubs							
Corylus avellana-type	2	2	2	3	3	5	0
Ericaceae	0	0	0	1	0	0	0
Ilex aquifolium	0	1	0	0	0	0	0
Herbs							
Chenopodiaceae	1	0	0	1	2	2	0
Stellaria holostea	0	0	0	0	1	0	0
Filipendula	1	0	0	1	0	0	0
Apium-type	0	0	1	0	0	0	0
Mentha-type	0	0	0	0	3	0	0
Plantaginaceae	0	0	0	8	0	0	0
Plantago lanceolata	1	0	0	4	0	0	0
Rubiaceae	0	0	0	0	1	0	0
Lactuceae	0	0	0	6	15	7	0
Cichorium intybus-type	0	0	0	0	7	3	0
Mycelis muralis-type	1	0	0	0	0	0	0
Solidago virgaurea-type	1	2	1	0	0	0	0
Achillea-type	1	0	0	0	1	0	0
Cyperaceae undiff.	25	2	7	6	38	63	1
Poaceae undiff.	6	2	8	5	14	15	0
Avena-type	0	0	0	0	2	1	0
Poaceae <40mu Anl-D <9mu	2	0	1	1	1	0	0
Aquatics							
Alisma-type	1	0	0	0	0	0	0
Potamogeton natans-type	1	0	1	0	0	1	0
Spores							
Polypodium	0	0	1	0	2	0	0
Pteridium aquilinum	1	2	0	5	18	15	0
Pteropsida (monolete) indet.	0	1	1	1	2	1	6
Summary							
Trees	7	4	9	8	12	8	1
Shrubs	2	3	2	4	3	5	0
Herbs	39	6	18	32	85	91	1
Aquatics	2	0	1	0	0	1	0
Spores	1	3	2	6	22	16	6
Total Land Pollen	48	13	29	44	100	104	2

Monolith 203-1: Trench 3815TT (through floodplain fines above BA brushwood structure)							
	5-6	15-16	25-26	40-41	50-51	60-61	68-69
	Cm	cm	cm	cm	cm	cm	cm
Total Pollen + Spores	51	16	32	50	122	121	8
Total traverses	1.00	1.00	1.00	1.00	0.35	0.71	1.00
TP+S per traverse	51	16	32	50	349	170	8
Trees (%TLP)	14.58	30.77	31.03	18.18	12.00	7.69	50.00
Shrubs (%TLP)	4.17	23.08	6.90	9.09	3.00	4.81	0.00
Herbs (%TLP)	81.25	46.15	62.07	72.73	85.00	87.50	50.00
Aquatics (%TLP)	4.17	0.00	3.45	0.00	0.00	0.96	0.00
Spores (%TLP)	2.08	23.08	6.90	13.64	22.00	15.38	300.00
Pollen concentration							
Pollen concentration/cm3*1000	69.62	27.09	94.80	37.03	51.63	75.47	47.40
Upper 95% confidence limit	96.25	39.36	145.08	47.67	62.46	94.09	84.87
Lower 95% confidence limit	42.99	14.81	44.52	26.39	40.81	56.84	9.93
Exotic Lycopodium counted	8	7	4	16	28	19	2
Charcoal							
Charcoal fragments	7	9	24	76	42	87	1
Charcoal fragments/traverse	7.0	9.0	24.0	76.0	120.0	122.5	1.0
Charcoal concentration /cm3*1000	13.54	15.24	71.10	56.29	17.78	54.26	5.93
Others							
Tilletia sphagni						1	
Diploneis interrupta	2						
Determinable pollen preservation							
Amorphous	2	0	1	8	18	9	0
Corroded	0	2	5	2	0	0	1
Broken	6	2	3	2	18	16	0
Folded	31	10	22	34	60	82	1
Well Preserved	8	2	1	4	26	14	6
Determinable pollen preservation %TP+S							
Amorphous	3.92	0.00	3.13	16.00	14.75	7.44	0.00
Corroded	0.00	12.50	15.63	4.00	0.00	0.00	12.50
Broken	11.76	12.50	9.38	4.00	14.75	13.22	0.00
Folded	60.78	62.50	68.75	68.00	49.18	67.77	12.50
Well Preserved	15.69	12.50	3.13	8.00	21.31	11.57	75.00
Indeterminable pollen preservation							
Amorphous	0	0	1	1	1	1	1
Corroded	0	0	0	1	0	0	0
Broken	0	0	0	2	4	0	0
Folded	7	2	3	12	0	4	0
Concealed	3	0	2	3	4	1	0
Indeterminable pollen preservation %TP+S							
Amorphous	0.00	0.00	3.13	2.00	0.82	0.83	12.50
Corroded	0.00	0.00	0.00	2.00	0.00	0.00	0.00
Broken	0.00	0.00	0.00	4.00	3.28	0.00	0.00
Folded	13.73	12.50	9.38	24.00	0.00	3.31	0.00
Concealed	5.88	0.00	6.25	6.00	3.28	0.83	0.00

Monolith 203-1: Trench 3815TT (through floodplain fines above BA brushwood structure)							
	5-6	15-16	25-26	40-41	50-51	60-61	68-69
	Cm	cm	cm	cm	cm	cm	cm
Total	19.61	12.50	18.75	38.00	7.38	4.96	12.50
Unknown							
Unknown Grains	2	0	2	1	1	1	0

Table 24: Pollen from monolith 203-2

Monolith 203-2: Trench 3815TT (through floodplain fines above IA? brushwood structure)									
	5-6	9-10	20-21	30-31	35-36	40-41	60-61	65-66	70-71
	cm	cm	Cm	cm	cm	cm	cm	cm	cm
Trees									
Pinus sylvestris	0	0	0	2	1	0	2	1	0
Ulmus	0	1	0	1	0	0	0	0	0
Quercus	1	1	2	3	2	2	2	2	0
Betula	0	1	0	0	0	0	0	0	0
Alnus glutinosa	1	0	1	3	2	4	2	2	0
Tilia cordata	0	1	0	1	1	0	2	0	0
Fraxinus excelsior	0	1	0	0	0	0	0	0	0
Shrubs									
Corylus avellana-type	1	2	8	8	5	8	1	4	0
Herbs									
Ranunculaceae	2	1	0	0	1	0	0	0	0
Chenopodiaceae	2	4	0	1	0	0	0	2	0
Caryophyllaceae	0	0	1	0	0	0	0	0	0
Filipendula	0	0	1	0	0	0	0	0	0
Fabaceae	0	1	0	0	0	0	0	0	0
Apium-type	0	1	0	0	0	0	0	0	0
Plantaginaceae	2	0	0	2	1	1	1	0	0
Plantago coronopus	0	0	0	0	0	0	0	1	0
Plantago lanceolata	0	0	1	0	0	0	0	0	0
Rubiaceae	0	0	1	0	0	0	0	0	0
Lactuceae	0	1	1	0	1	1	0	2	0
Mycelis muralis-type	0	0	0	0	0	1	0	0	0
Solidago virgaurea-type	0	0	0	2	0	0	0	0	0
Achillea-type	0	1	0	0	1	0	0	0	0
Cyperaceae undiff.	15	4	13	7	8	7	2	24	0
Poaceae undiff.	7	4	12	6	11	14	3	12	1
Avena-type	0	0	0	1	0	0	0	1	0
?Secale cereale	1	0	0	0	0	0	0	0	0
Poaceae <40mu Anl-D <9mu	0	0	0	1	0	0	0	0	0
Aquatics									
Nymphaea alba	0	0	0	0	0	0	0	3	0
Menyanthes trifoliata	0	0	0	0	0	0	0	1	0
Alisma-type	0	0	0	0	0	0	0	1	0
Potamogeton natans-type	0	0	0	0	0	0	0	1	0
Sparganium emersum-type	0	1	0	0	0	0	0	0	0
Spores									
Ophioglossum	0	0	0	0	0	0	1	0	0
Polypodium	0	0	0	0	0	0	1	0	0

Monolith 203-2: Trench 3815TT (through floodplain fines above IA? brushwood structure)									
	5-6	9-10	20-21	30-31	35-36	40-41	60-61	65-66	70-71
	cm	cm	Cm	cm	cm	cm	cm	cm	cm
Pteridium aquilinum	2	1	0	3	1	1	2	3	0
Pteropsida (monolete) indet.	3	0	0	0	2	1	5	4	0
Summary									
Trees	2	5	3	10	6	6	8	5	0
Shrubs	1	2	8	8	5	8	1	4	0
Herbs	29	17	30	20	23	24	6	42	1
Aquatics	0	1	0	0	0	0	0	6	0
Spores	5	1	0	3	3	2	9	7	0
Total Land Pollen	32	24	41	38	34	38	15	51	1
Total Pollen + Spores	37	26	41	41	37	40	24	64	1
Total traverses	1	1	1	1	1	1	1	1	1
Trees (%TLP)	6.25	20.83	7.32	26.32	17.65	15.79	53.33	9.80	0.00
Shrubs (%TLP)	3.13	8.33	19.51	21.05	14.71	21.05	6.67	7.84	0.00
Herbs (%TLP)	90.63	70.83	73.17	52.63	67.65	63.16	40.00	82.35	100.00
Aquatics (%TLP)	0.00	4.17	0.00	0.00	0.00	0.00	0.00	11.76	0.00
Spores (%TLP)	15.63	4.17	0.00	7.89	8.82	5.26	60.00	13.73	0.00
Pollen concentration									
Pollen concentration/cm3*1000	87.69	61.62	48.59	97.17	109.61	47.40	28.44	54.17	3.95
Upper 95% confidence limit	129.48	91.71	65.72	143.20	167.31	64.16	39.15	70.16	8.51
Lower 95% confidence limit	45.90	31.53	31.45	51.14	51.92	30.64	17.73	38.18	
Exotic Lycopodium counted	5	5	10	5	4	10	10	14	3
Charcoal									
Charcoal fragments	23	4	3	15	8	5	12	32	3
Charcoal concentration /cm3*1000	54.51	9.48	3.56	59.25	23.70	5.93	14	27.09	12
Others									
Type 143 fungal spore									1
Tilletia sphagni		2							
Determinable pollen preservation									
Amorphous	1	3	2	7	4	11	2	8	0
Corroded	3	3	4	3	4	4	1	1	0
Broken	5	1	1	6	3	2	3	10	0
Folded	22	11	20	20	15	16	14	35	1
Well Preserved	6	8	14	6	11	7	4	10	0
Determinable pollen preservation %TP+S									
Amorphous	2.70	11.54	4.88	17.07	10.81	27.50	8.33	12.50	0.00
Corroded	8.11	11.54	9.76	7.32	10.81	10.00	4.17	1.56	0.00
Broken	13.51	3.85	2.44	14.63	8.11	5.00	12.50	15.63	0.00
Folded	59.46	42.31	48.78	48.78	40.54	40.00	58.33	54.69	100.00
Well Preserved	16.22	30.77	34.15	14.63	29.73	17.50	16.67	15.63	0.00
Indeterminable pollen preservation									
Amorphous	0	0	0	3	2	1	1	1	0
Corroded	0	0	1	0	0	0	0	0	0
Broken	6	1	0	1	0	1	0	0	0

Monolith 203-2: Trench 3815TT (through floodplain fines above IA? brushwood structure)									
	5-6	9-10	20-21	30-31	35-36	40-41	60-61	65-66	70-71
	cm	cm	Cm	cm	cm	cm	cm	cm	cm
Folded	0	2	1	5	3	0	3	2	0
Concealed	1	4	1	2	2	2	1	3	2
Indeterminable pollen preservation %TP+S									
Amorphous	0.00	0.00	0.00	7.32	5.41	2.50	4.17	1.56	0.00
Corroded	0.00	0.00	2.44	0.00	0.00	0.00	0.00	0.00	0.00
Broken	16.22	3.85	0.00	2.44	0.00	2.50	0.00	0.00	0.00
Folded	0.00	7.69	2.44	12.20	8.11	0.00	12.50	3.13	0.00
Concealed	2.70	15.38	2.44	4.88	5.41	5.00	4.17	4.69	200.00
Total	18.92	26.92	7.32	26.83	18.92	10.00	20.83	9.38	200.00
Unknown									
Unknown Grains	1	0	3	0	2	3	0	1	0

Table 25: Pollen from monolith 126

Monolith 126 - Trench 3815TT - M126 (adjacent to Roman revetment structure)						
	10-11	20-21	30-31	40-41	50-51	62-63
	cm	cm	cm	cm	cm	cm
Trees						
Pinus sylvestris	0	1	1	4	1	0
Ulmus	0	2	0	1	1	0
Fagus sylvatica	1	0	0	0	0	0
Quercus	5	6	1	13	6	0
Betula	1	1	1	1	0	1
Alnus glutinosa	15	2	2	12	15	0
Tilia cordata	0	0	2	4	0	1
Fraxinus excelsior	0	0	0	1	1	0
Shrubs						
Corylus avellana-type	14	5	4	11	8	0
Salix	0	0	0	1	0	0
Hedera helix	1	0	0	0	0	0
Herbs						
Ranunculaceae	1	0	0	0	1	0
Caltha palustris-type	0	2	1	0	0	0
Chenopodiaceae	8	4	3	7	2	0
Spergula-type	1	0	0	0	0	0
Persicaria maculosa-type	0	2	0	0	0	0
Rumex acetosa	4	0	2	0	0	0
Oxyria digyna	0	2	0	1	0	0
Armeria maritima	0	0	0	1	0	0
Brassicaceae	1	0	0	0	0	0
Saxifragaceae	1	0	0	0	0	0
Rosaceae	0	1	0	0	1	0
Filipendula	0	0	0	0	1	0
Sanguisorba minor	0	0	0	0	1	0
Fabaceae	1	0	0	0	0	0
Geranium	0	0	0	1	0	0
Apium-type	0	0	0	0	1	0
Convolvulus arvensis	0	0	1	1	0	0
Mentha-type	0	0	1	0	0	0
Plantaginaceae	0	1	3	6	6	0
Plantago coronopus	0	2	3	0	2	0

Monolith 126 - Trench 3815TT - M126 (adjacent to Roman revetment structure)						
	10-11	20-21	30-31	40-41	50-51	62-63
	cm	cm	cm	cm	cm	cm
Plantago maritima	1	1	1	0	0	0
Plantago lanceolata	6	0	0	0	0	0
Lactuceae	6	4	1	4	8	0
Cichorium intybus-type	0	5	0	0	0	0
Solidago virgaurea-type	2	0	2	2	0	0
Artemisia-type	1	0	0	1	1	0
Achillea-type	1	4	1	1	1	0
Cyperaceae undiff.	4	10	5	1	7	1
Poaceae undiff.	25	36	23	25	36	0
Avena-type	0	3	0	0	1	0
Hordeum-type	0	0	0	1	0	0
Poaceae <40mu AnI-D <9mu	0	5	0	0	1	0
Aquatics						
Potamogeton natans-type	0	0	0	0	1	0
Sparganium erectum	0	0	0	1	0	0
Typha latifolia	0	0	0	0	1	0
Spores						
Polypodium	0	2	1	2	0	1
Pteridium aquilinum	6	10	7	5	7	1
Pteropsida (monolete) indet.	7	7	5	2	5	2
Summary						
Trees	22	12	7	36	24	2
Shrubs	15	5	4	12	8	0
Herbs	63	82	47	52	70	1
Aquatics	0	0	0	1	2	0
Spores	13	19	13	9	12	4
Total Land Pollen	100	99	58	100	102	3
Total Pollen + Spores	113	118	71	110	116	7
Trees (%TLP)	22.00	12.12	12.07	36.00	23.53	66.67
Shrubs (%TLP)	15.00	5.05	6.90	12.00	7.84	0.00
Herbs (%TLP)	63.00	82.83	81.03	52.00	68.63	33.33
Aquatics (%TLP)	0.00	0.00	0.00	1.00	1.96	0.00
Spores (%TLP)	13.00	19.19	22.41	9.00	11.76	133.33
Total traverses	1.51	3.60	5.00	3.32	2.65	5.00
TP+S per traverse	75	33	14	33	44	1.40
Pollen concentration						
Pollen concentration/cm3*1000	21.60	15.33	5.13	17.15	27.49	0.34
Upper 95% confidence limit	25.01	17.46	5.86	19.71	32.15	0.47
Lower 95% confidence limit	18.18	13.20	4.40	14.59	22.84	0.21
Exotic Lycopodium counted	61	92	164	76	50	243
Charcoal						
Charcoal fragments	280	250	653	567	351	895
Charcoal fragments/traverse	185.4	69.4	130.6	170.8	132.5	179.0
Charcoal concentration /cm3*1000	54.39	32.20	47.18	88.41	83.19	43.65
Others						
Tilletia sphagni		1			1	

Monolith 126 - Trench 3815TT - M126 (adjacent to Roman revetment structure)						
	10-11	20-21	30-31	40-41	50-51	62-63
	cm	cm	cm	cm	cm	cm
Zygnemataceae				1		
Pediastrum					1	
Hepaticae					1	
Determinable pollen preservation						
Amorphous	2	9	14	20	16	1
Corroded	10	6	4	3	6	0
Broken	11	16	12	10	9	0
Folded	61	64	26	47	60	3
Well Preserved	29	24	15	30	25	3
Determinable pollen preservation %TP+S						
Amorphous	1.77	7.63	19.72	18.18	13.79	14.29
Corroded	8.85	5.08	5.63	2.73	5.17	0.00
Broken	9.73	13.56	16.90	9.09	7.76	0.00
Folded	53.98	54.24	36.62	42.73	51.72	42.86
Well Preserved	25.66	20.34	21.13	27.27	21.55	42.86
Indeterminable pollen preservation						
Amorphous	0	2	3	4	6	1
Corroded	0	0	0	0	0	0
Broken	2	4	0	3	4	1
Folded	9	5	0	7	10	1
Concealed	8	2	1	5	1	0
Indeterminable pollen preservation %TP+S						
Amorphous	0.00	1.69	4.23	3.64	5.17	14.29
Corroded	0.00	0.00	0.00	0.00	0.00	0.00
Broken	1.77	3.39	0.00	2.73	3.45	14.29
Folded	7.96	4.24	0.00	6.36	8.62	14.29
Concealed	7.08	1.69	1.41	4.55	0.86	0.00
Total	16.81	11.02	5.63	17.27	18.10	42.86
Unknown						
Unknown Grains	5	5	2	3	9	0

Table 26: Pollen from monolith 174

Monolith 174 - Trench 3815TT - M174 (through landsurface behind Roman revetment)												
	12-13	25-26	35-36	45-46	55-56	66-67	72-73	82-83	91-92	101-102	108-109	115-116
	cm	cm	cm	cm	cm	cm	cm	cm	Cm	cm	cm	cm
Trees												
Pinus sylvestris	5	3	0	1	4	2	0	3	1	0	0	0
Taxus baccata	1	0	0	0	0	0	0	0	0	0	0	0
Ulmus	0	0	0	0	1	0	1	0	0	0	0	0
Fagus sylvatica	0	0	0	0	0	1	2	1	0	0	0	0
Quercus	0	3	3	4	5	9	6	5	1	0	0	0
Betula	0	0	0	0	2	1	2	0	0	0	0	0
Alnus glutinosa	1	1	0	3	7	6	2	2	0	1	1	1
Tilia cordata	1	0	0	0	1	0	0	0	1	0	0	1
Populus	1	0	0	0	0	0	0	0	0	0	0	0
Shrubs												
Corylus avellana-type	1	3	7	7	25	4	41	9	1	1	1	0
Salix	0	0	0	0	0	0	0	1	0	0	0	0

Monolith 174 - Trench 3815TT - M174 (through landsurface behind Roman revetment)												
	12-13	25-26	35-36	45-46	55-56	66-67	72-73	82-83	91-92	101-102	108-109	115-116
	cm	cm	cm	cm	cm	cm	cm	cm	Cm	cm	cm	cm
Herbs												
Ranunculaceae	0	2	0	0	0	0	0	0	0	0	0	0
Caltha palustris-type	0	0	0	0	0	0	1	0	0	0	0	0
Urticaceae	0	0	0	0	0	0	0	1	0	0	0	0
Chenopodiaceae	3	3	1	1	11	6	5	1	1	0	0	0
Caryophyllaceae	0	1	0	0	0	0	0	0	0	1	0	0
Polygonum	0	1	0	1	0	0	0	0	0	0	0	0
Rumex acetosa	0	3	0	0	0	0	0	1	0	0	0	0
Malva sylvestris-type	0	0	0	0	0	3	0	0	0	0	0	0
Brassicaceae	0	0	2	0	0	0	0	0	0	0	0	0
Saxifragaceae	1	0	0	0	0	0	0	0	0	0	0	0
Lythrum salicaria-type	0	0	0	0	0	1	0	0	0	0	0	0
Daphne	0	0	1	0	3	0	1	0	0	0	0	0
Geranium	0	0	0	0	0	1	0	0	0	0	0	0
Apiaceae	1	0	0	0	0	0	0	0	0	0	0	0
Apium-type	1	0	1	1	1	0	0	2	0	0	0	0
Plantaginaceae	2	8	0	0	0	0	1	0	0	0	0	1
Rubiaceae	0	1	0	0	0	0	0	0	0	0	0	0
Dipsacus	1	0	0	0	0	0	0	0	0	0	0	0
Centaurea cyanus	1	0	0	0	0	0	0	0	0	0	0	0
Lactuceae	17	5	1	4	2	2	1	1	5	1	0	0
Cichorium intybus-type	0	0	1	1	0	0	0	0	0	0	0	0
Sonchus	0	0	0	0	0	0	0	0	1	0	0	0
Solidago virgaurea-type	4	2	0	0	4	1	0	0	3	0	0	0
Artemisia-type	0	0	1	0	0	0	0	1	0	1	0	0
Achillea-type	0	0	1	2	1	1	0	1	0	0	0	0
Cyperaceae	35	8	11	11	12	0	0	2	7	2	0	0
Poaceae undiff.	22	17	14	24	19	69	37	37	5	0	0	0
Avena-type	2	5	1	0	0	0	0	0	0	0	0	0
Hordeum-type	0	0	0	0	2	1	1	0	0	0	0	0
Poaceae <40mu Anl-D <9mu	0	6	1	1	1	1	3	1	0	0	0	0
Aquatics												
Alisma-type	1	1	1	0	0	0	0	1	0	0	0	0
Potamogeton natans-type	1	0	0	0	0	0	0	1	0	0	0	0
Sparganium emersum-type	0	0	0	0	1	0	0	0	0	0	0	0
Typha latifolia	2	0	0	0	0	0	0	0	0	0	0	0
Spores												
Ophioglossum	0	0	0	0	0	0	0	0	7	0	0	0
Polypodium	1	2	0	2	1	0	1	0	0	0	1	0
Pteridium aquilinum	6	1	2	2	5	3	3	1	14	1	1	0
Pteropsida (monolete) indet.	5	1	1	2	6	0	1	1	6	13	7	0
Pteropsida (trilete) indet.	0	0	0	0	0	1	1	0	0	0	0	0
Sphagnum	0	0	0	0	0	0	0	0	1	0	0	0
Summary												
Trees	9	7	3	8	20	19	13	11	3	1	1	2
Shrubs	1	3	7	7	25	4	41	10	1	1	1	0
Herbs	90	62	36	46	56	86	50	48	22	5	0	1
Aquatics	4	1	1	0	1	0	0	2	0	0	0	0
Spores	12	4	3	6	12	4	6	2	28	14	9	0

Monolith 174 - Trench 3815TT - M174 (through landsurface behind Roman revetment)												
	12-13	25-26	35-36	45-46	55-56	66-67	72-73	82-83	91-92	101-102	108-109	115-116
	cm	cm	cm	cm	cm	cm	cm	cm	Cm	cm	cm	cm
Total Land Pollen	100	72	46	61	101	109	104	69	26	7	2	3
Total Pollen + Spores	116	77	50	67	114	113	110	73	54	21	11	3
Trees (%TLP)	9.00	9.72	6.52	13.11	19.80	17.43	12.50	15.94	11.54	14.29	50.00	66.67
Shrubs (%TLP)	1.00	4.17	15.22	11.48	24.75	3.67	39.42	14.49	3.85	14.29	50.00	0.00
Herbs (%TLP)	90.00	86.11	78.26	75.41	55.45	78.90	48.08	69.57	84.62	71.43	0.00	33.33
Aquatics (%TLP)	4.00	1.39	2.17	0.00	0.99	0.00	0.00	2.90	0.00	0.00	0.00	0.00
Spores (%TLP)	12.00	5.56	6.52	9.84	11.88	3.67	5.77	2.90	107.69	200.00	450.00	0.00
Total traverses	3.30	1.00	1.00	1.00	1.00	0.75	0.77	1.00	1.00	1.00	1.00	1.00
TP+S per traverse	35.15	77.00	50.00	67.00	114.00	150.67	142.86	73.00	54.00	21.00	11.00	3.00
Pollen concentration												
Pollen concentration/ cm3*1000	10.03	41.48	21.94	23.35	28.74	58.22	68.61	78.64	30.47	8.58	0.85	0.30
Upper 95% confidence limit	11.30	51.50	27.19	28.27	33.73	71.54	85.65	104.08	38.31	11.04	1.12	0.47
Lower 95% confidence limit	8.77	31.45	16.70	18.43	23.76	44.90	51.56	53.20	22.63	6.12	0.59	0.12
Exotic Lycopodium counted	137	22	27	34	47	23	19	11	21	29	153	119
Charcoal												
Charcoal fragments	477	93	54	94	149	49	101	53	55	63	402	572
Charcoal concentration /cm3*1000	41.26	50.09	23.70	32.76	37.57	23.25	62.99	57.10	31.04	25.74	31.14	56.96
Others												
Tilletia sphagni								1				
Zygnemataceae					1							
Pediastrum				1								
Determinable pollen preservation												
Amorphous	30	1	2	9	10	4	6	6	11	4	0	1
Corroded	2	4	3	2	4	5	2	1	1	3	1	1
Broken	11	6	5	5	8	6	11	3	8	2	4	0
Folded	66	52	32	38	61	51	42	34	27	5	3	1
Well Preserved	7	14	8	13	31	47	49	29	7	7	3	0
Determinable pollen preservation %TP+S												
Amorphous	25.86	1.30	4.00	13.43	8.77	3.54	5.45	8.22	20.37	19.05	0.00	33.33
Corroded	1.72	5.19	6.00	2.99	3.51	4.42	1.82	1.37	1.85	14.29	9.09	33.33
Broken	9.48	7.79	10.00	7.46	7.02	5.31	10.00	4.11	14.81	9.52	36.36	0.00
Folded	56.90	67.53	64.00	56.72	53.51	45.13	38.18	46.58	50.00	23.81	27.27	33.33
Well Preserved	6.03	18.18	16.00	19.40	27.19	41.59	44.55	39.73	12.96	33.33	27.27	0.00
Indeterminable pollen preservation												
Amorphous	4	1	0	0	3	0	2	0	4	0	0	0
Corroded	0	0	0	1	0	0	0	0	0	0	1	0
Broken	3	6	0	2	3	2	3	0	4	0	0	1
Folded	11	5	8	4	7	5	2	4	5	0	0	0
Concealed	1	1	2	0	3	2	0	0	1	0	2	0
Indeterminable pollen preservation %TP+S												
Amorphous	3.45	1.30	0.00	0.00	2.63	0.00	1.82	0.00	7.41	0.00	0.00	0.00
Corroded	0.00	0.00	0.00	1.49	0.00	0.00	0.00	0.00	0.00	0.00	9.09	0.00
Broken	2.59	7.79	0.00	2.99	2.63	1.77	2.73	0.00	7.41	0.00	0.00	33.33

Monolith 174 - Trench 3815TT - M174 (through landsurface behind Roman revetment)												
	12-13	25-26	35-36	45-46	55-56	66-67	72-73	82-83	91-92	101-102	108-109	115-116
	cm	cm	cm	cm	cm	cm	cm	cm	Cm	cm	cm	cm
Folded	9.48	6.49	16.00	5.97	6.14	4.42	1.82	5.48	9.26	0.00	0.00	0.00
Concealed	0.86	1.30	4.00	0.00	2.63	1.77	0.00	0.00	1.85	0.00	18.18	0.00
Total	16.38	16.88	20.00	10.45	14.04	7.96	6.36	5.48	25.93	0.00	27.27	33.33
Unknown												
Unknown Grains	2	3	0	0	4	5	3	6	5	0	0	0

Table 27: Pollen from monolith 175

Monolith 175 - Trench 3815TT - M175 (floodplain fines - ?Roman channel in front of revetment)									
	24-25	36-37	51-52	68-69	79-80	89-90	98-99	109-110	118-119
	cm	cm	cm	cm	cm	cm	cm	cm	cm
Trees									
Pinus sylvestris	0	0	0	0	3	2	2	1	1
Ulmus	0	0	0	0	1	0	0	0	1
Fagus sylvatica	0	0	0	0	0	1	0	0	0
Quercus	0	1	3	5	12	12	6	5	5
Betula	0	1	0	0	1	3	0	1	0
Alnus glutinosa	0	0	0	1	5	6	5	5	2
Tilia cordata	0	0	1	0	1	0	0	0	0
Shrubs									
Corylus avellana-type	0	0	0	2	6	16	8	5	0
Herbs									
Chenopodiaceae	0	0	1	3	0	7	1	1	1
Polygonaceae	0	1	0	0	1	0	1	0	0
Brassicaceae	0	1	0	0	1	0	0	0	0
Lysimachia vulgaris-type	0	0	0	0	0	1	0	0	0
Saxifragaceae	0	0	1	0	0	0	0	0	0
Apium-type	0	0	1	0	0	0	0	0	0
Plantaginaceae	0	0	1	1	0	0	0	0	0
Lactuceae	0	0	0	0	4	0	0	0	0
Mycelis muralis-type	0	0	0	0	0	0	0	0	1
Solidago virgaurea-type	0	0	1	0	1	1	0	0	0
Artemisia-type	0	0	0	0	0	1	0	0	0
Achillea-type	0	0	0	0	0	0	1	0	0
Cyperaceae undiff.	1	1	1	7	6	1	3	2	5
Poaceae undiff.	1	7	3	4	10	6	9	4	4
Poaceae <40mu Anl-D <9mu	0	0	2	0	0	0	0	0	0
Aquatics									
Menyanthes trifoliata	0	0	0	1	0	1	0	0	0
Alisma-type	0	0	1	0	0	0	0	0	0
Sparganium emersum-type	0	0	0	1	0	0	0	0	0
Spores									
Ophioglossum	0	0	0	0	1	0	0	0	0
Polypodium	0	0	0	1	2	1	1	0	0
Pteridium aquilinum	0	1	0	1	4	0	3	1	0
Pteropsida (monolete) indet.	0	0	0	5	6	1	1	0	0
Sphagnum	0	0	0	0	0	0	1	1	0

Monolith 175 - Trench 3815TT - M175 (floodplain fines - ?Roman channel in front of revetment)									
	24-25	36-37	51-52	68-69	79-80	89-90	98-99	109-110	118-119
	cm	cm	cm	cm	cm	cm	cm	cm	cm
Summary									
Trees	0	2	4	6	23	24	13	12	9
Shrubs	0	0	0	2	6	16	8	5	0
Herbs	2	10	11	15	23	17	15	7	11
Aquatics	0	0	1	2	0	1	0	0	0
Spores	0	1	0	7	13	2	6	2	0
Total Land Pollen	2	12	15	23	52	57	36	24	20
Total Pollen + Spores	2	13	16	32	65	60	42	26	20
Trees (%TLP)	0.00	16.67	26.67	26.09	44.23	42.11	36.11	50.00	45.00
Shrubs (%TLP)	0.00	0.00	0.00	8.70	11.54	28.07	22.22	20.83	0.00
Herbs (%TLP)	100.00	83.33	73.33	65.22	44.23	29.82	41.67	29.17	55.00
Aquatics (%TLP)	0.00	0.00	6.67	8.70	0.00	1.75	0.00	0.00	0.00
Spores (%TLP)	0.00	8.33	0.00	30.43	25.00	3.51	16.67	8.33	0.00
Total traverses	1	1	1	1	1	1	1	1	1
Pollen concentration									
Pollen concentration/cm3*1000	0.35	51.35	23.70	15.80	40.54	44.44	82.95	10.27	39.50
Upper 95% confidence limit	0.61	84.24	33.96	20.07	51.11	56.94	119.16	13.02	57.89
Lower 95% confidence limit	0.10	18.46	13.44	11.53	29.96	31.93	46.74	7.52	21.11
Exotic Lycopodium counted	67	3	8	24	19	16	6	30	6
Charcoal									
Charcoal fragments	49	3	30	182	130	205	70	61	96
Charcoal concentration /cm3*1000	8.67	11.83	44.44	89.86	81.08	151.83	138.25	24.10	189.60
Others									
Dinoflagellate cysts								1	1
Pediastrum						1			
Determinable pollen preservation									
Amorphous	1	3	2	5	8	6	3	4	3
Corroded	0	1	0	1	4	3	0	1	0
Broken	0	2	2	6	7	2	5	2	2
Folded	1	6	10	17	33	24	26	14	11
Well Preserved	0	1	2	3	13	25	8	5	4
Determinable pollen preservation %TP+S									
Amorphous	50.00	23.08	12.50	15.63	12.31	10.00	7.14	15.38	15.00
Corroded	0.00	7.69	0.00	3.13	6.15	5.00	0.00	3.85	0.00
Broken	0.00	15.38	12.50	18.75	10.77	3.33	11.90	7.69	10.00
Folded	50.00	46.15	62.50	53.13	50.77	40.00	61.90	53.85	55.00
Well Preserved	0.00	7.69	12.50	9.38	20.00	41.67	19.05	19.23	20.00
Indeterminable pollen preservation									
Amorphous	0	0	1	0	3	2	1	0	0
Corroded	0	0	0	0	0	1	0	0	0
Broken	1	0	0	1	0	3	0	1	0
Folded	1	1	2	3	3	2	1	0	1

Monolith 175 - Trench 3815TT - M175 (floodplain fines - ?Roman channel in front of revetment)									
	24-25	36-37	51-52	68-69	79-80	89-90	98-99	109-110	118-119
	cm	cm	cm	cm	cm	cm	cm	cm	cm
Concealed	0	1	2	1	1	1	0	4	0
Indeterminable pollen preservation %TP+S									
Amorphous	0.00	0.00	6.25	0.00	4.62	3.33	2.38	0.00	0.00
Corroded	0.00	0.00	0.00	0.00	0.00	1.67	0.00	0.00	0.00
Broken	50.00	0.00	0.00	3.13	0.00	5.00	0.00	3.85	0.00
Folded	50.00	7.69	12.50	9.38	4.62	3.33	2.38	0.00	5.00
Concealed	0.00	7.69	12.50	3.13	1.54	1.67	0.00	15.38	0.00
Total	100.00	15.38	31.25	15.63	10.77	15.00	4.76	19.23	5.00
Unknown									
Unknown Grains	0	1	1	0	1	1	4	2	0

APPENDIX 12 - RADIOCARBON DATING

12.1 Intoduction

12.1.1 Three AMS radiocarbon dates have been obtained from a key Holocene (later Prehistoric) sequence in trench 3815TT. The samples were selected in order to provide dating evidence for the pollen sequence in this trench (Samples 194, 202-3, context 3815016 - see also Appendix 11) and for a roundwood structure (wattle panel) found on top of the peat (sample 199, structure 3815013, within context 3815030).

12.2 Method

12.2.1 All three samples were wood peat: 199 was associated with the wattle structure; 194 was stratigraphically below the wattle structure in the main body of the peat. The third sample (203-2) was taken from a monolith column, from a level in the peat stratigraphically below the wattle structure, an equivalent horizon to sample 194.

12.2.2 The samples were submitted to the University of Waikato, Hamilton, New Zealand, for dating. Visible contaminants were removed initially. Chemical pre-treatment comprised washing with 10% concentrated HCL, rinsing, then washing in hot 2% NaOH after which they were washed again in 10% HCL, rinsed and dried. The base insoluble fraction was selected for dating. The results are Conventional Age as per Stuiver and Polach, 1977, Radiocarbon, 19, 355-363. This is based on the Libby half-life of 5568 yr with correction for isotopic fractionation applied. Quoted errors are 1 standard deviation due to counting statistics, multiplied by an experimentally determined Laboratory Error Multiplier of 1.217.

12.3 Results

12.3.1 The results are presented in Table 28 below.

Table 28: Radiocarbon results obtained during the assessment (calibrated using OxCal program)

Lab ref	Context	Sample	Date	1ς	2ς	Comment
Wk-9786	ARC ESG00, sample 203-2 (monolith depth 57-62cm), context 3815016	Wood peat	3340ρ49 bp	1690 (48.7%) 1580 cal BC 1570 (19.5%) 1520 cal BC	1740 (95.4%) 1490 cal BC	From main peat body below wattle structure
Wk-9787	ARC ESG00, sample 199 (bulk), context 3815030	Wood peat	3326ρ52 bp	1690 (68.2%) 1520 cal BC	1740 (95.4%) 1490 cal BC	From top of peat bvody, associated with wattle structure
Wk-9788	ARC ESG00, sample 194 (bulk), context 3815016	Wood peat	3335ρ53 bp	1690 (68.2%) 1520 cal BC	1750 (95.4%) 1490 cal BC	From main peat body below wattle structure

APPENDIX 13 - SMR SHEET

Site Name: Ebbsfleet Sports Ground, Ebbsfleet Valley

Summary:

The Oxford Archaeological Unit (OAU) was commissioned by Union Railways (North) Limited (URN) to undertake An evaluation on the site of the Ebbsfleet Sports Ground, Ebbsfleet Valley, Northfleet (ARC ESG00). A geoarchaeological desktop assessment of borehole and test pit records was carried out, the results of which are incorporated in this report. The work formed part of an extensive programme of archaeological investigation carried out in advance of the construction of the Channel Tunnel Rail Link (CTRL).

District: Dartford	**Parish:** Swanscombe and Greenhithe
Period(s): 1. Palaeolithic 2. Neolithic / Bronze Age 3. Late Iron Age / Roman	4. Anglo-Saxon
NGR Easting: ~~516462~~ 561462	**NGR Northing:** 174164
Type of Recording: Evaluation (Delete) ~~Excavation~~	~~Watching Brief~~ ~~Field Walking~~ ~~Geophysical Survey~~ ~~Measured Survey~~
Date of Recording: (From) 19/03/01	(To) 28/05/01

Unit Undertaking Recording: Oxford Archaeological Unit

Summary of Fieldwork Results:

The Oxford Archaeological Unit (OAU) was commissioned by Union Railways (North) Limited (URN) to undertake an evaluation on the site of the Ebbsfleet Sports Ground Archaeological Works, on land within the Ebbsfleet Valley, south of Northfleet, near Gravesend, Kent (ARC ESG00). This work formed part of an extensive programme of archaeological investigation carried out in advance of the construction of the CTRL. The site has been divided into four topographical zones, based on the general characteristics of the sediments present: Zone 1 (North Valley Side), Zone 2 (South Valley Side), Zone 3 (Valley Bottom) and Zone 4 (Gravel Spur - Northfleet Villa).

Pleistocene/ Paleolithic

Late Middle and Late Pleistocene deposits were present, dating from Oxygen Isotope Stages (OSI) 8–2 (300,000 to 10,000 BP).

Middle Palaeolithic (Levalloisian) archaeological evidence was present in colluvial/ solifluction deposits from earlier in this range in Zone 2 (South Valley Side), probably Oxygen Isotope Stages (OIS) 8 to 6 (300,000 to 130,000) and possibly also OIS 5 to 4 (115,000 to 60,000 BP). The artefacts in these deposits have probably been transported a

short distance by colluvial/ solifluction processes, but the assemblages are unlikely to have been distorted by differential size-sorting. There is also still some potential for the recovery of undisturbed horizons within these deposits. Although very few palaeoenvironmental indicators have been recovered, the proximity of the site to known fossiliferous deposits within the Bakers Hole SAM suggest that potential for such deposits remains high within the CTRL route.

Holocene: Palaeoenvironment

The waterlogged Holocene alluvial sequence filling the valley bottom is rich in paleoenvironmental indicators potentially capable of documenting changes in climate, sea-level change, vegetation and human land-use. Pollen, waterlogged plant macrofossils, insects and molluscs are all abundant and evidence for broad-scale environmental change can be detected in the trenches assessed. When correlated and dated this data will enable detailed reconstruction of rising water levels throughout the Holocene. The assessed environmental sequences were recovered from sequences containing later prehistoric and Roman waterlogged structures, offering excellent potential for dating the sequence. Problems have been encountered in the extraction of foraminifera and ostracods for assessment and large scale analysis may not therefore be possible. Geoarchaeological modelling of the major stratigraphic units, using 376 stratigraphic logs, has been used to generate preliminary projections of the extent of the wetlands in the Neolithic, Bronze Age and Roman periods.

Holocene: prehistoric

Evidence for Neolithic/ Bronze activity was generally sparse across most of the site, for the most part comprising redeposited worked flint. However, substantial, possibly *in situ*, concentrations of artefacts, including pottery as well as flint, are present adjacent to the Ebbsfleet in trenches 3835TT and 3836TT. The Neolithic/ Bronze Age pottery cannot at present be separated, although a single sherd of Ebbsfleet ware makes it likely that at least some of the material is mid-late Neolithic. Evidence for Middle Bronze Age activity is present, comprising a few small pottery sherds found in association with a waterlogged wattle structure made from roundwood, possibly part of a collapsed fence or fish trap. The pottery itself was undiagnostic but radiocarbon dating of the roundwood structure has produced a calibrated result of 1690 - 1520 calBC at 68.2% probability.

Holocene: Roman

Roman activity is concentrated at the southern end of the site in Zone 4, in the area of the extensively excavated Northfleet Villa, and in Zone 2, where a possible building has been identified. The main building complex is generally poorly preserved as a result of extensive previous archaeological investigations (in 1909-11 and 1978-84) stone-robbing and peripheral quarry activity (including construction of a tramway through the site in the early 20th century). However, pockets of surviving stratigraphy may be expected, particularly in the deeper deposit sequences adjacent on the edge of the alluvial basin. There is also high potential for recovery of waterlogged remains of unpredictable nature and extent in the floodplain, in immediate proximity to the Roman building complex, including evidence for revetment and management of channels in the wetlands and structures and dumped debris associated with the occupation area.

Holocene: Anglo-Saxon

Two sherds of Anglo-Saxon pottery were found unstratified in the vicinity of the Roman Villa complex, adding to slight evidence from previous excavations for Anglo-Saxon activity on the site.

Location of Archive / Finds: OAU **Bibliography:** URN 2001, *Ebbsfleet Sports Ground, Kent (ARC ESG00), Phase II Evaluation Archaeological Works, Fieldwork Report*, client report prepared by OAU for Union Railways (North) Limited	
Summary Compiler: Stuart Foreman	**Date:** 14/8/01

APPENDIX 14 - SUMMARY REPORT

The Oxford Archaeological Unit (OAU) was commissioned by Union Railways (North) Limited (URN) to undertake an evaluation on the site of the Ebbsfleet Sports Ground Archaeological Works, on land within the Ebbsfleet Valley, south of Northfleet, near Gravesend, Kent (ARC ESG00). This work formed part of an extensive programme of archaeological investigation carried out in advance of the construction of the CTRL. The site has been divided into four topographical zones, based on the general characteristics of the sediments present: Zone 1 (North Valley Side), Zone 2 (South Valley Side), Zone 3 (Valley Bottom) and Zone 4 (Gravel Spur - Northfleet Villa).

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Holocene: Palaeoenvironment

The waterlogged Holocene alluvial sequence filling the valley bottom is rich in paleoenvironmental indicators potentially capable of documenting changes in climate, sea-level change, vegetation and human land-use. Pollen, waterlogged plant macrofossils, insects and molluscs are all abundant and evidence for broad-scale environmental change can be detected from the trenchsamples that have been assessed. When correlated and dated this data will enable detailed reconstruction of rising water levels throughout the Holocene. The assessed environmental sequences were recovered from sequences containing later prehistoric and Roman waterlogged structures, offering excellent potential for dating the sequence. Problems have been encountered in the extraction of foraminifera and ostracods for assessment and large scale analysis may not therefore be possible. Geoarchaeological modelling of the major stratigraphic units, using 376 stratigraphic logs, has been used to generate preliminary projections of the extent of the wetlands in the Neolithic, Bronze Age and Roman periods.

Holocene: prehistoric

Evidence for Neolithic/ Bronze activity was generally sparse across most of the site, for the most part comprising redeposited worked flint. However, substantial, possibly *in situ*, concentrations of artefacts, including pottery as well as flint, are present adjacent to the Ebbsfleet in trenches 3835TT and 3836TT. The Neolithic/ Bronze Age pottery cannot at present be separated, although a single sherd of Ebbsfleet ware makes it likely that at least some of the material is mid-late Neolithic. Evidence for Middle Bronze Age activity is present, comprising a few small pottery sherds found in association with a waterlogged wattle structure made from roundwood, possibly part of a collapsed fence or fish trap. The pottery

itself was undiagnostic but radiocarbon dating of the roundwood structure has produced a calibrated result of 1690 - 1520 calBC at 68.2% probability.

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Roman activity is concentrated at the southern end of the site in Zone 4, in the area of the extensively excavated Northfleet Villa, and in Zone 2, where a possible building has been identified. The main building complex is generally poorly preserved as a result of extensive previous archaeological investigations (in 1909-11 and 1978-84) stone-robbing and peripheral quarry activity (including construction of a tramway through the site in the early 20th century). However, pockets of surviving stratigraphy may be expected, particularly in the deeper deposit sequences adjacent on the edge of the alluvial basin. There is also high potential for recovery of waterlogged remains of unpredictable nature and extent in the floodplain, in immediate proximity to the Roman building complex, including evidence for revetment and management of channels in the wetlands and structures and dumped debris associated with the occupation area.

Holocene: Anglo-Saxon

Two sherds of Anglo-Saxon pottery were found unstratified in the vicinity of the Roman Villa complex, adding to slight evidence from previous excavations for Anglo-Saxon activity on the site.

APPENDIX 15 - TRENCH SUMMARY SHEETS

Zone 1 - Valley Side (North) Trench 3782TT

Trench No.	3782TT	Ground surface datum mOD	5.31	Co-ordinates	URL 41228.03E / 54438.62	OS 561223.76E / 174439.62N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.25	3782001	Topsoil	-	-	-	Topsoil
0.25-0.70	3782002	Sandy clay-silt, gravelly towards base, cohesive and mod. Compact, massive	-	-	Occ. flint artefacts and fire-cracked flint pebbles	Holocene colluvium
0.70-0.80	3782003	Patch of sandy/silty flint gravel (f-m)	-	-	-	Holocene colluvium
0.80-1.60	3782004	Laminated fine sands and silty sands, with small-scale vertical faulting	-	-	-	Pleistocene colluvium
1.60-1.80	3782005	Yellowish-brown fine silty sand, with fine wavy discontinuous laminations; dips and thickens downhill to southeast	-	-	-	Pleistocene colluvium
1.80-2.00	3782006	Loose, well-sorted m-c flint gravel in sandy and shelly (Tertiary frag's) matrix	S.1	None	None	Pleistocene solifluction (slumped Pleistocene fluvial deposits)
2.00-2.50	3782007	Yellowish-brown faintly bedded m-f silty sand with faint remnants of fine sub-parallel laminations	27	V. occ molluscs, prob. Pleistocene	-	Pleistocene colluvium (??patch , or slumped patch, of fluvial deposits)
2.50-2.90	3782008	Patch of fine sand with densely packed, very poorly sorted flint clasts (nodules and pebbles 1-30cm)	-	-	-	Pleistocene solifluction
2.50-2.90	3782009	Chalk and flint gravel (f-vc) in silty sand matrix, clast supported in places, paler and more Chalk-rich in upper part	S.2 13	None None	-	Pleistocene solifluction
2.90-3.25	3782010	Pale brown Chalk diamict with some sand and flint gravel	-	-	-	Pleistocene solifluction
3.25-3.70	3782011	White Chalk diamict with occ. flint nodules and chunks	-	-	-	Pleistocene solifluction, grading into degraded Chalk bedrock

Zone 4: Gravel Spur - Trench 3836TT

Trench No.	3836TT	Ground surface datum	1.34m O.D.	Co-ordinates	URL 41729.58E / 54056.67N	OS 561725.27E / 174057.72N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
-	3836001	Topsoil	-		None	
-	3836002	Made-up ground	-		None	
-	3836003	Mid orange-brown silty-sand	-		None	Colluvial layer
-	3836004	Grey sandy-silt	-		None	Possible alluvial deposit
-	3836005-008, 3836011	Cut for ditch 3836005, filled by 3836006, 3836007, 3836008 and 3836011	-		CBM (10), pot (5), 1 bone, 1 burnt flint	Ditch, dated 2nd century +, possibly boundary ditch associated with villa-complex
-	3836009-10	Cut for ditch 3836009, filled by 3836010	-		None	Re-cut of ditch 3836005
-	3836012	Mid grey silty-sand	-		Flint artefacts (26), pot (3)	Deposit of uncertain origin
-	3836013	Mid orangey-brown sand silt	-		Flint artefacts (47), pot (3), burnt flint (103)	Probable colluvial layer
-	3836014	Dark brown-grey sand silt	-		Flint artefacts (8), burnt flint (31)	Possible organic layer overlying buried soil 3836015
-	3836015	Light yellow sand silt	-		Flint artefacts (70), burnt flint (90)	Possible buried soil layer of colluvial origin
2.35-2.47	3836016	Brown sandy-silt	-		1 flint artefact	?Holocene/Pleistocene colluvium
2.48-2.75	3836017	Grey sandy-silt	-		None	?Holocene/Pleistocene fluvial?
2.75-3.35	3836018	Grey sand	-		None	?Holocene/Pleistocene fluvial?
3.35-5.35	3836019	Dark grey fine sand	-		None	?Holocene/Pleistocene fluvial?

Zone 4: Gravel Spur - Trench 3835TT

Trench No.	3835TT	Ground surface datum	3.22m O.D.	Co-ordinates	URL 41702.99E / 54068.72N	OS 561698.67E / 174069.76N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
-	3835001	Topsoil	-		None	
-	3835002	mid greyish-brown clay-silt	-		CBM (8), pot (1), flint artefacts (9), burnt flint (1), 1 bone	Ploughsoil
-	3835003	Mid greyish-brown clay-silt	-		None	Ploughsoil?
-	3835004	Light grey clayey-sand	-		Flint artefacts (7), 1 burnt flint	Alluvial deposit?
1.55-1.65	3835005	Grey-brown sandy-silt	-			?Holocene/Pleistocene fluvial?
-	3835006, 3835009, 3835018-19	Cut 3835006, filled by 3835009, 3835018 and 3835019	109, 111		Flint artefacts (3)	Irregular cut, possibly natural or associated with burning activity
-	3835007-08	Cut for gully/ditch 3835007, filled by 3835008	107, 108		Flint artefacts (5), burnt flint (18)	Large gully or small ditch possibly for drainage purposes
-	3835010-14	Cut for pit or ditch 3835014, filled by 3835010, 3835011, 3835012, 3835013 – only seen in small test pit	-		None	Ditch or pit
1.65-2.00	3835015	Reddish-brown silty sands with roots	-		None	?Holocene/Pleistocene fluvial? and possible weathering horizon
2.00-2.35	3835016	Reddish-brown silty-sand	-		None	?Holocene/Pleistocene fluvial?
2.35-4.55	3835017	Light grey soft sands with shells	110		None	?Holocene/Pleistocene fluvial?
-	3835020	Light grey sandy-silt	-		None	Pleistocene fluvial/alluvial deposit?
-	3835021	Light grey silt	-		None	Pleistocene fluvial/alluvial deposit?

Trench No.	3834 TT	Ground surface datum	2.30 m OD	Co-ordinates	URL 41682.99E / 54092.65N	OS 561678.68E / 174093.69N	
Depth	**Context Number**	**Description of unit**		**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
		by 3834027					
-	3834030-32	Cut for ditch 3834032, filled by 3834030		55		None	Curvilinear ditch
-	3834039	Group number, consists of 3834024 and 3834028		-		See 3834023-24	Ditch 3834024/3834028
-	3834040	Group number, consists of 3834029 and 3834032		-		See 3834027-29	Ditch 3834029/3834032
0.30-0.70	3834041	Mixture of humic topsoil, claysilt and modern cbm		-	-	None	Recent made ground/dumping
0.70-1.00	3834042	Friable dark grayish brown sandy clay-silt		-	-	None	Truncated subsoil
1.00-1.20	3834043	Cohesive dark grayish black sandy cl-silt		-		None	Late Holocene (post-Roman) ploughzone/floodplain deposition?
-	3834044	Cut		-	-	None	Basal cut of 3834002
1.20-5.40	3834003	Well compacted, strong brown sandy cl-silt with wavy sub-horizontal streaks of calc. Precipitation, also calc. precipitation infilling sub-vertical fissures; grading down into sl. silty f-c sands with occ. mollusc frag's		S.1-4 56, 57, 58, 59	Plei. Mollusc frag's seen	None	Pleistocene (Holocene??) colluvium, maybe floodplain facies towards base
5.40-5.50 base not reached	3834045	Mod. loose m-c flint gravel in coarse sandy matrix with occ. larger flint nodules 15-25cm size, only top 10cm of deposit reached		-	-	None	Pleistocene high energy fluvial activity - braided channel system?

Zone 4: Gravel Spur - Trench 3834TT

Trench No.	3834 TT	Ground surface datum	2.30 m OD	Co-ordinates	URL 41682.99E / 54092.65N	OS 561678.68E / 174093.69N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.30	3834001	Topsoil	-	-	None	Topsoil over recently made ground
-	3834002	Mixture of humic topsoil, claysilt and modern cbm	-	-	None	Recent made ground/dumping associated with river bank
-	3834004-05	Cut for pit 3834004, filled by 3834005	-		CBM (22), pot (2), bones (9), 1 slag	Very large cut in river bank, possibly dating from 2nd century +
-	3834006-07	Cut for pit 3834006, filled by 3834007	-		Flint artefacts (4), burnt flint (131)	Large pit cut into river bank
-	3834008-10	Cut for pit 3834008, filled by 3834009 and 3834010	-		Flint artefacts (2), burnt flint (47)	Small shallow pit
-	3834011-12	Cut for pit 3834011, filled by 3834012	-		Flint artefacts (2), burnt flint (20), bones (3), pot (1)	Squared pit, dated mid 2nd century +
-	3834013-14	Cut for pit 3834013, filled by 3834014	54		CBM (22), pot (14), bones (12), 1 slag, burnt flint (6)	Large cut, possibly dating from late 1st to 2nd century
-	3834015-16	Cut for pit 3834015, filled by 3834016	-		Burnt flint (63)	Small shallow pit
-	3834017-18, 3834034-36	Cut for pit 3834017, filled by 3834018, 3834034, 3834035 and 3834036	-		Flint artefacts (4), burnt flint (4)	Small pit containing evidence of burning
-	3834019-20, 3834037-38	Cut for ditch 3834019, filled by 3834020, 3834037 and 3834038	53		CBM (1), pot (2), flint artefacts (6), burnt flint (7), bones (8)	Linear ditch running east-west, possibly dating from 1st to 2nd century
-	3834021-22	Cut for gully 3834021, filled by 3834022	-		Pot (4), flint artefacts (13), burnt flint (20), bones (3)	Small irregular gully, possibly dating from late Bronze Age or earlier
-	3834023-24	Cut for ditch 3834024, filled by 3834023	-		Pot (2), burnt flint (44)	Ditch, dated from 1st century
-	3834025-33	Cut for ditch 3834033, filled by 3834025	-		None	Ditch, truncated by ditch cut 3834028
-	3834026-28	Cut for ditch 3834028 (same as 3834024), filled by 3834026	-		None	Ditch, same as 3834024
-	3834027-29	Cut for ditch 3834029 (same as 3834032), filled	-		Flint artefacts (6)	Ditch, same as 3834032

Zone 4: Gravel Spur - Trench 3833TT

Trench No.	3833 TT	Ground surface datum	4.02 m OD	Co-ordinates	URL 41673.81E / 54062.29N		OS 561669.50E / 174063.33N
Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**		**Interpretation**
0.00-0.15	3833001	Sandy and pebbly cl-silt with abundant chalk pebbles and cobbles	-	-	None		Recently made/disturbed ground
0.15-0.60	3833002	Mid grayish brown cl-silty sand with mod. Common f-c flint pebbles	-	-	Pot (3)		Truncated subsoil
1.15-2.45	3833003	Soft to mod. Firm, pale yellowish brown, silty f-m sand, middle part siltier and firmer, bottom part softer pure fine sand and slightly gravelly at base, where there is a sharp erosive boundary	-	-	None		Prob. colluvium, probably Holocene, maybe Pleistocene
-	3833004-05	Cut for ditch 3833004, filled by 3833005	-		Pot (6), flint artefact (4), 1 iron object, shell (5)		Linear ditch running East-west, possibly early Anglo-Saxon (?)
-	3833006-09	Cut for ditch 3833006, filled by 3833007, 3833008, 3833009	-	-	Pot (3), flint artefacts (5), burnt flint (10), wall plaster (2)		Ditch possibly associated with the villa (possibly dating 1st to 2nd century)
0.85-1.15	3833010	Mod. Compacted to firm, yellowish brown sandy cl-silt with occ. chalk flecks	-	Occ. Charcoal flecks (not sampled)	None		Roman plough-soil
2.45-4.20	3833011	Soft to mod. Firm, light brown bedded with light gray, sl. sandy silt/v. silty sand with occ. v. fine sub-angular flint and chalk pebbles; clear discontinuous horiz. Bedding; top 10cm contains nodular carbonate conc's 2-5cm size; sparse molluscs seen	S.1 60	Sparse whole and fragmentary moll's seen, inc. *Pup. Muscorum*	None		Pleistocene colluvium/solifluction
4.20-4.90 base not seen	3833012	Soft and loose, poorly sorted, v. pale brown f-vc chalk and flint gravel in chalk silt matrix, clasts gen. sub-angular to rounded, contains mod. common larger flint pebbles 10-15cm size and occ. flint nodules and pieces up to 25cm particularly at top surface; gen. coarsening and becoming more flinty downwards	S.2 S.3	-	None		Pleistocene fluvial (maybe solifluction?)
0.60-0.85	3833013	Mod. firm and friable, dark brown v. sandy cl-silt with freq. vf-m flint and chalk pebbles, and occ. charcoal flecks	-	Charcoal flecks (not sampled)	CBM (1), pot (2), 1 flint artefact, 1 bone		Roman plough-soil, dated late 1st century +

Zone 4: Gravel Spur - Trench 3832TT

+

Trench No.	**3832 TT**	**Ground surface datum**	**4.42 m OD**	**Co-ordinates**	**URL 41626.44 E / 54096.82 N**	**OS 561622.13 E / 174097.86 N**

Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
-	3832001	Modern backfill of previous excavation trenches	-		None	
-	3832002	Flint wall running east-west. Dimensions; 5.37m long x 0.35m wide x 0.2m deep	-		None	Wall almost parallel to 3832003, 1.5m to the north of this one, with which it possibly forms an external corridor
-	3832003	Flint faced wall with chalk infill. Dimensions; 5.9m long x 0.6m wide x 0.07 deep	-		None	E-W wall which seems to form the SW corner of a building with 3832004
-	3832004	Flint and limestone wall. Dimensions 4.2m long x 0.4m wide x 0.25m deep	-		None	N-S wall which seems to form the SW corner of a building with 3832003
-	3832005	Chalk and flint foundation. Dimensions 1.9m long x 0.6m wide x 0.45m deep	-		None	Foundation for structure (wall?). Different build to other 3 walls in this trench
-	3832006-07	Cut for irregular feature 3832007, filled by 3832006	-		None	Consisting of SE-NW linear and sub-circular large pit
-	3832008	Natural brickearth	-		None	

Trench No.	3831 TT	Ground surface datum	4.42 m OD	Co-ordinates	URL 41626.44 E / 54096.82 N	OS 561622.13 E / 174097.86 N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
-	3831013	Chalk, limestone and flint rough faced rubble wall. Dimensions: 1.35m long x 0.32m wide x 0.10m deep	-		None	Internal division wall which would have served as a N-S room divider
-	3831014	Opus signinum and flint rubble wall. Dimensions: 1.4m long x 0.4m wide x 0.10m deep	-		None	Internal wall divider at western end. May relate to an extension of the building area in conjunction with perimeter wall 3831012 and wall 3831015
-	3831015	Flint rubble nodules and opus signinum matrix wall. Dimensions: 2.2m long x 0.3m wide x 0.15m deep	-		None	E-W internal wall at western end. Meets block and cobbles 3831016 with the gap/thinning possibly having been a doorway/gap with footing
-	3831016	Flint nodule rubble block with mortar bond and mud bon cobbling to south	-		None	Rubble block and cobbling in NW area. Block may have originally extended to meet west wall of 3831005
-	3831017	Pit containing burning and stoke-hole structure	-		None	Heart and stoke-hole structure at eastern end of trench. Possible outer work area of the building divided from the main area by wall 3831006
-	3831018	Cut containing large flint rubble blocks with mud bond.	-		None	Construction cut running N-S containing remains of robbed wall or drain.

Zone 4: Gravel Spur - Trench 3831TT

Trench No.	3831 TT	Ground surface datum	4.42 m OD	Co-ordinates	URL 41626.44 E / 54096.82 N	OS 561622.13 E / 174097.86 N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
-	3831001	Brown clay-silt with modern material	-		4 pieces of plaster	Plough-soil and excavation backfill material
-	3831002	Made up ground	-		None	20th century made-up ground
-	3831003	Dark-brown clay-silt	-		None	Post-Roman sub-soil
-	3831004	Grey clay-silt	-		None	Roman occupation horizon on which all Roman material is constructed
-	3831005	3 walls forming sides of room, hearth and 2 floors in internal area. Room dimensions: 5.4m E-W x 4m N-S x 0.9m deep	-		None	Annexe room comprising at least 2 phases of construction
-	3831006	Wall constituted of flint, stone rubbles and CBM, 6 courses maximum, 1.6m long x 0.75m wide x 0.6m deep	-		None	Perimeter wall, eastern continuation of walls 3831011, 3831012
-	3831007	Cut for linear gully running SE-NW, fill removed by previous excavation	-		None	Gully running across SW part of trench. Predates Roman building.
-	3831008	Cobbles surface (flint and pebbles) robbed out in places. Dimensions: 3.2m long x 1.75m wide	-		None	Cobbled surface in middle of area. Relationships with surrounded structures lost as it has been robbed out
-	3831009	Tile and sandy mortar surface with inclusions of pebbles, CBM and flint. Dimensions: 2.3m N-S x 1.5m E-W x 0.08m thick	-		None	Mortar -tile surface north of wall 3831006, badly damaged
-	3831010	2 rectilinear pits	-		None	Pits in NE corner of excavation
-	3831011	Rough faced limestone and flint rubble wall. Dimensions: 5.5m long x 0.7m wide x 0.4m deep	-		None	East-west perimeter wall , continues east as 3831006 and west as 3831012. At East, there is a doorway/gap between 3831011 and 3831006
-	3831012	Flint, limestone, CBM and cobbles opus signinum matrix wall. Dimensions: 2.5m long x 0.5m wide x 0.45m deep	-		None	Continuation/extension of perimeter wall 3831011. Probably later extension of the building.

Zone 4: Gravel Spur - Trench 3830TT

Trench No.	3830 TT	Ground surface datum	4.42 m OD	Co-ordinates	URL 41588.93E / 54083.11N	OS 561584.63E / 174084.15N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.20-0.70	3830001	Mod. firm, mid grayish brown cl-silty sand with occ. f-c flint pebbles	-	-	None	Subsoil
0.70-0.95	3830002	Firm, dark grayish brown sandy cl-silt with freq. m-c flint pebbles	-	-	CBM (20), pot (5), iron objects (2), 1 bone, flint artefacts (7)	Post-Roman ploughsoil, pottery dated 2-3rd century
0.95-1.15	3830003	Firm dark grayish brown cl-silty sand with mod. Freq. m-c flint pebbles and charcoal flecks	-	Charcoal frag's (not sampled)	1 pot, 1 flint artefact	Roman occupation layer with derived late prehistoric flint artefacts
-	3830004	Limestone block	-	-	CBM (17)	Roman building block, destroyed piece/in situ?
1.15-1.50	3830005	Firm, strong brown, sl. silty m-c sand	-	-	None	Holocene (Pleistocene??) colluvium, top part; with Roman occup. surface above it?
1.50-2.30	3830006	Soft to mod. Firm, brownish yellow to yellowish brown v. sl. silty m-c sand	-	-	None	Holocene (Pleistocene??) colluvium, main body
2.30-4.00	3830007	Mod. firm, yellowish brown silty fine sand with seam 10cm thick of f-c chalk and flint gravel containing mod. freq. flint nodules 15-25cm size towards base (at 3.60m depth)	-	-	None	Pleistocene colluvium/solifluction
4.00-4.50	3830008	Firm, mod.-poorly sorted, matrix supported vf-c chalk and flint gravel in calc. silty sand matrix with occ. flint nodules and pieces 15-20cm size; gen. dipping gently N	S.1-2 73	-	None	Pleistocene solifluction
0.00-0.20	3830009	Topsoil and turf	-	-	None	Topsoil and turf
4.50-5.40	3830010	Mod. firm to firm, yellowish brown sl. silty fine sand containing occ. mollusc frag's	71, 72	Molluscs frag's seen during fieldwork, not known yet whether Pleistocene	None	Pleistocene colluvium/solifluction
5.40-6.25	3830011	Soft, white, v. poorly sorted matrix-supported vf-vc chalk and flint gravel in chalk silt matrix, with occ. flint nodules and pieces 15-20cm size	-	-	None	Pleistocene solifluction (fluvial??)

Zone 4: Gravel Spur - Trench 3820TT

Trench No.	3820 TT	Ground surface datum	4.42 m OD	Co-ordinates	URL 41572.27E / 54089.46 N		OS 561567.97E / 174090.50 N
Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**		**Interpretation**
-	3820001	Topsoil	-		None		
-	3820002	Mid yellowish brown clay-silt	-		None		Colluvial layer
-	3820003	Mid brown silty-clay	-		CBM (43), bone (1), stone (1), Iron objects (4)		Ploughed colluvial layer
-	3820004	Cobbling, roughed metalled surface	-		CBM (3), pot (9), shells (8), iron objects (4), bones (6), 1 copper alloy object		Cobbles surface, dated mid 2nd century +
-	3820005-06, 3820026	Well – cut 3820006, fill 3820005, stone face 3820026	-		Pot (4), bones (5)		Roman well
-	3820007-09	Robber trench – cut 3820008, fill 3820007	-		CBM (12), bones (2), stone (1), shells (2)		Probable robbed wall
-	3820010-012	Construction cut for wall 3820012, filled by 3820011, wall 3820010	-		None		Wall
-	3820013-14	Cut for pit 3820014, filled by 3820013	-		CBM (11), pot (3), 1 shell		Pit, dated 2nd century +
-	3820015-16	Cut for pit 3820016, filled by 3820015	-		CBM (9), pot (9), 1 flint artefact, shells (7), iron objects (3), bones (14)		Squared pit
-	3820017-18, 3820024	Natural dip in terrace 3820018, filled by redeposited alluvium 3820017 and building debris 3820024	-		CBM (29), pot (2), 1 iron object		Natural dip in terrace, filled with material dated 2nd century +
-	3820019	Yellowish-green clay	-		None		Alluvial clay deposit possibly redeposited
-	3820020-21	Cut for pit 3820021, filled by 3820020	-		None		Sub-rounded pit
-	3820022-23	Cut for pit 3820022, filled by 3820023	-		None		Pit
-	3820025	Light greyish-green clay	-		None		Natural alluvial clay
-	3820027	Mid orangey-brown clay-silt	-		None		Natural clay-silt
-	3820028-29	Cut 3820029, filled by 3820028	-		None		Late cut into uppermost colluvium, unknown purpose

Zone 3: Valley Bottom - Trench 3837TT

Trench No.	3837TT	Ground surface datum	2.62m O.D.	Co-ordinates	URL 41443.68E / 54136.57N	OS 561439.39E / 174137.60N
Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-0.22	3837001	Topsoil	-		None	
0.22-0.75	3837002	Sandy-clay	-		None	Holocene colluvium
0.75-0.85	3837003	Dark brown silty-clay	-		Flint artefacts (2)	Holocene colluvium
0.85-1.30	3837004	Yellow brown clay-silt	-		None	Holocene colluvium
1.30-1.50	3837005	Light grey silty clay with gravel	-		Bones (36)	Holocene colluvium
1.50-1.90	3837006	Slightly organic silt clay	-		None	Holocene colluvium/alluvium
1.90-2.10	3837007	Light grey silt clay	-		CBM (10), pot (1), flint artefact (1)	Holocene colluvium/alluvium
2.10-5.10	3837008	Reddish brown flint gravel	-		None	Late Pleistocene braided channel
5.10-5.50	3837009	Bedded flint gravel	-		None	Late Pleistocene braided channel
5.50-6.00	3837010	Chalk rubble	-		None	Late Pleistocene solifluction

Zone 3: Valley Bottom Trench 3828TT

Trench No.	3828TT	Ground surface datum	3.43m O.D.	Co-ordinates	URL 41473.21E / 54107.28N	OS 561468.92E / 174108.32N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.10	3828001	Topsoil	-		None	
0.10-0.50	3828002	Made ground	-		None	
0.50-1.10		Sandy clay-silt	-		None	Holocene active channel or colluvium
1.10-1.50	3828003	Grey clay-silt	91		None	Holocene intertidal mudflats
1.50-1.90	3828004	Blue grey clay-silt	87		None	Holocene intertidal mudflats
1.90-2.00	3828004	Yellow sand with artefacts	-		CBM (5), bones (14)	Holocene intertidal sandflats
2.00-2.20	3828004	Blue grey clay-silt	-		None	Holocene intertidal mudflats
2.20-2.35	3828005/ 3828006	Cut 3828005, filled by 3828006 (greyish-brown silty-clay)	90		Flint artefacts (7)	Holocene freshwater channel
2.35-3.00	3828007	Grey sandy-silt	88		None	Holocene freshwater channel
-	3828008	Orangey brown silty-clay	89		None	Alluvium
-	3828009	Orangey-brown gravel silt	-		1 undiagnostic waste flake	Pleistocene gravel?
3.00-6.50	3828010	Bedded chalky gravel and sands	-		None	Later Pleistocene ?solifluction, ?freshwater, ?colluvium
-	3828011	Mid-greyish-brown silty-clay	92		None	Buried land surface

Zone 3: Valley Bottom - Trench 3819TT

Trench No.	3819TT	Ground surface datum		Co-ordinates	URL 41574.59E / 54123.25N		OS 561570.29E / 174124.29N
Depth (metres)	**Context Number**	**Description of unit**	**Samples**		**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-0.30	3819001	Topsoil	-			None	
0.30-1.30	3819002	Made ground	-			None	
1.30-1.40	3819003	Dark greyish-brown clay peat	-			None	Peat
2.25-2.40	3819004	Mid greyish-blue silty-clay	-			None	Possible stream deposit
1.55-2.90	3819005	Dark greyish-brown clay peat	-			None	Peat
1.60-2.35	3819006	Light greyish-blue silty-clay	-			None	Silty clay deposit
2.30-3.00	3819007	Mid greyish-blue silty-clay	-			CBM (14), stone (3), flint artefact (1), bones (8)	Silty clay deposit
3.00-3.20	3819008	Light greyish-blue silty-clay	-			None	Possibly bottom of river/stream
3.20-3.30	3819009	Very poorly sorted flint gravel	-			None	Late Pleistocene braided channel
3.30-3.75	3819010	Mid grey silt with shells	-			None	Late Pleistocene channel
3.75-4.00	3819011	Angular flint gravel	184			None	Late Pleistocene high energy braided channel

Trench No.	3818TT	Ground surface datum	3.11m O.D.	Co-ordinates	URL 41544.29E / 54139.00N	OS 561539.99E / 174140.03N
Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
1.40-1.70	3818025	Grey silt with organic fragments and Roman CBM	175 monolith		CBM (9), bones (14), flint artefact (1)	Possible dump layer
-	3818026-28	Posts or stakes within layer 3818025	-		None	Posts or stakes possibly contemporary with the revetment 3818019
-	3818029	Flint nodules and limestone blocks with brush wood inclusions	-		None	Possible light revetment or concentration of rubble along foreshore of river channel
-	3818030-34	Possible planks or wood fragments within layer 3818025	-		None	Wood fragments
-	3818035	Flint gravel	-		None	Low gravel bank on foreshore of silted river channel
-	3818036	Light grey silt	-		None	Thin layer of silting on bank of river channel
-	3818037	Light grey sand with flint gravel	-		None	Pocket of sandy gravel sealed between layers of silting on river channel bank
1.70-1.75	3818038	Grey silt	-		None	Holocene intertidal mudflats
1.75-2.10	3818039	Coarse silt	197		None	Holocene intertidal mudflats
2.10-2.70	3818040	Flint gravel	196		None	Late Pleistocene braided channel
2.70-4.00	3818041	Chalky gravel	195		None	Late Pleistocene braided channel

Zone 3: Valley Bottom - Trench 3818TT

Trench No.	**3818TT**	**Ground surface datum**	**3.11m O.D.**	**Co-ordinates**	**URL 41544.29E / 54139.00N**	**OS 561539.99E / 174140.03N**

Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-0.40	3818001	Topsoil	-		None	
0.40-1.40	3818002	Made ground	174 monolith, 175 monolith		None	
-	3818003	Dark orange-brown peaty clay	174 monolith		None	Possible buried soil layer
-	3818004	Yellowish-brown silty clay	174 monolith		None	Alluvial deposit
-	3818005	Blue-grey silty-clay	174 monolith		None	Alluvial deposit
-	3818006	Dark greyish-brown peaty clay (same as 381813)	174 monolith		None	Buried Roman soil layer
-	3818007	Dark greyish-brown peaty clay	174 monolith		None	Buried Roman soil layer
-	3818008	Orangey-grey silty-clay	174 monolith		None	Fluvial deposit
-	3818009	Yellowish-brown silty-clay	-		None	Alluvial deposit (?)
-	3818010	Blue-grey silty-clay	-		None	Alluvial deposit
-	3818011	Dark greyish-brown peaty clay	-		None	?
-	3818012	Greyish-blue silty-clay	-		CBM (2), pot (1)	River related silty layer
-	3818013	Dark greyish-blue silty-clay + peat	-		None	Reed peat
-	3818014	Orangey-grey silty-clay (same as 3815008)	-		None	Fluvial deposit
-	3818015	Blue-grey silty-clay (same as 3818005)	-		None	Alluvial deposit
-	3818016-18	Cut of gully 3818016, filled by 3818017, 3818018	175 monolith		Flint artefact (9)	Curvi-linear gully
-	3818019-23	Structure number 3818019, consists of 1 timber plank (3818022-23) + 2 upright posts or stakes (3818020-21)	170		None	Roman revetment along the edge of Ebbsfleet channel
-	3818024	Blue-grey silty-clay	175 monolith		1 flint artefact, 1 burnt flint	Layer associated with Roman revetment, contains ceramic building material

Zone 3: Valley Bottom - Trench 3817TT

Trench No.	3817TT	Ground surface datum	3.21m O.D.	Co-ordinates	URL 41526.25E / 54150.29N	OS 561521.95E / 174151.32N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.25	3817001	Topsoil	-		None	
0.25-1.50	3817002	Made ground	-		None	
1.50-1.80	3817003	Dark greyish-brown clayey peat	-		None	Holocene low energy upper tidal marsh?
1.80-2,75	3817004	Grey clay-silt	-		None	Holocene intertidal mudflats
2.75-3.25	3817005	Dark greyish-brown clayey peat	-		None	Holocene low energy upper tidal marsh?
3.25-3.85	3817006	Silty clay with gravel clasts	-		None	Late Pleistocene colluvium/solifluction
3.85-5.10	3817007	Gravelly clay	-		None	Late Pleistocene colluvium/solifluction

Zone 3: Valley Bottom - Trench 3816TT

Trench No.	**3816TT**	**Ground surface datum**	**3.29m O.D.**	**Co-ordinates**	**URL 41510.56E / 54134.74N**	**OS 561506.26E / 174135.78N**

Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-0.20	3816001	Top soil	-		None	
0.20-1.20	3816002	Made ground	-		None	
1.20-1.35	3816003	Reed peat	176		None	Holocene low energy upper tidal marsh?
1.35-1.75	3816004	Light grey clay-silt	177		None	Holocene intertidal mudflats
1.75-2.00	3816005	Brown grey clay-silt	178		Flint artefact (21), burnt flint (5), fired-clay (1), bones (3)	Holocene intertidal mudflats
2.00-2.25	3816006	Gark greyish-brown peat	179		None	Holocene low energy upper tidal marsh?
-	3816007	Brownish-grey clay-silt	181		None	Alluvial silt
-	3816008	Dark brown peat	182		None	Reed peat
2.25-2.75	3816009	Light greyish-brown silt	180		None	Holocene intertidal mudflats
2.75-3.30	3816010	Gravelly silt	183		None	Late Pleistocene braided channel
3.30-4.50	3816011	Gravel	-		None	Late Pleistocene braided channel
4.50-6.0	3816012	Sand and gravel	200		None	Late Pleistocene braided channel

Zone 3: Valley Bottom Trench 3815TT

Trench No.	3815TT	Ground surface datum	3.20m O.D.	Co-ordinates	URL 41466.55E / 54163.11N	OS 561462.26E / 174164.14N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.20	3815001	Topsoil	-		None	
0.20-1.40	3815002	Made ground	-		None	
1.40-1.45	3815003	Mid grey clay-silt	185, 203 column		None	Holocene intertidal mudflats
1.45-1.55	3815004	Brown peaty clay-silt	186		None	Holocene low energy upper tidal marsh?
1.55-1.65	3815005	Greenish-grey clay-silt	187		None	Holocene intertidal mudflats
1.65-1.75	3815006	Brown peaty clay-silt	188		None	Holocene low energy upper tidal marsh?
1.75-1.90	3815007	Light greenish-grey clay-silt	189		None	Holocene intertidal mudflats
1.90-2.05	3815008	Light grey clay-silt	190		None	Holocene intertidal mudflats
2.05-2.15	3815009	Brown peat	191		None	Holocene low energy upper tidal marsh?
2.15-2.25	3815010	Brown clay-silt	192		None	Holocene intertidal mudflats
2.25-2.45	3815011	Light grey clay-silt	193, 203 column		None	Holocene intertidal mudflats
-	3815012, 3815014	Cut 3815014, filled by 3815012	-		None	Possibly a channel at southern end of trench
2.50-2.55	3815013, 3815019-29	Brushwood structure number 3815013, 3815019-3815029 wood samples	203 column		Pot (12), fired clay (1), 1 bone, flint artefacts (6), burnt flint (15)	Platform?
2.45-2.50	3815015	Brown clay-silt with timbers	201, 203 column		Bone (1)	Holocene intertidal mudflats
2.60-3.25	3815016	Mid brown peat	194, 203 column		None	Holocene ?alder carr wetland
3.25-3.50	3815017	Light blue-grey clay-silt	-		None	Holocene intertidal mudflats
-	3815018	Light green sand and gravel	-		None	Sandy gravel
2.55-2.60	3815030	Mid grey-brown clay-silt	199			Holocene intertidal mudflats

Zone 3: Valley Bottom Trench 3814TT

Trench No.	3814TT	Ground surface datum	3.57m O.D.	Co-ordinates	URL 41475.22E / 54172.11N	OS 561470.93E / 174173.14N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.10	3814001	Topsoil	-		None	
0.10-1.80	3814002	Made ground	-		None	
1.80-2.00	3814003	Dark grey peat	93		None	Holocene low energy upper tidal marsh?
2.30-2.50	3814004	Light greeny-brown peat	94		CBM (1), bone (1)	Holocene low energy upper tidal marsh?
2.05-2.10	3814005	White chalk pellets	-		None	
2.00-2.05	3814006	Light grey-green clay-silt	96		None	Holocene intertidal mudflats
2.20-2.30	3814007	Dark brown peat	97		None	Holocene low energy upper tidal marsh?
2.30-2.50	3814008	Light grey-green clay-silt	98		None	Holocene intertidal mudflats
-	3814010	Dark brown peat	99		None	Reedy peat
2.60-2.75	3814011	Grey-brown clay-silt	100		None	Holocene intertidal mudflats
2.75-2.90	3814012	Light grey-green clay silt	101		None	Holocene intertidal mudflats
2.90-3.10	3814013	Mid orangey-brown clay-silt	102		None	Holocene intertidal mudflats
3.15-4.00	3814014	Reed peat becoming wood peat with depth	103		None	Holocene alder carr wetland becoming reed swamp through time
-	3814015	Mid orangey peat becoming wood peat with depth	104		None	Peat
2.10-2.15	3814016	Light grey-green peat	95		None	Holocene low energy upper tidal marsh?
4.00-4.50	3814017	Flint gravel	-		Flint artefact (1)	Late Pleistocene braided channel
4.50-5.00	3814018	Clay-silt with flint gravel	-		None	Late Pleistocene braided channel
5.00-6.00	3814019	Silty gravel with chalk	-		None	Late Pleistocene braided channel

Zone 3: Valley Bottom Trench 3813TT

Trench No.	3813TT	Ground surface datum	3.08m O.D.	Co-ordinates	URL 41466.79/ 54211.11N	OS 561462.50E/ 174212.13N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.25	3813001	Topsoil	-		None	
0.25-1.10	3813002	Made ground	-		None	
1.10-1.15	3813003	Dark brown peat	-		None	Holocene low energy upper tidal marsh?
1.15-1.50	3813004	Blue-grey clay-silt	-		None	Holocene intertidal mudflats
1.50-1.90	3813005	Light brown-grey clay-silt	-		None	Holocene intertidal mudflats
1.90-2.10	3813006	Grey-brown peat	-		None	Holocene low energy upper tidal marsh?
2.10-2.35	3813007	Brownish-grey clay-silt	-		None	Holocene intertidal mudflats
2.35-2.45	3813008	Blue-grey clay-silt	-		None	Holocene intertidal mudflats
2.45-2.70	3813009	Mid blue-grey clay-silt	-		None	Holocene intertidal mudflats
2.70-3.00	3813010	Mid brown clay-silt	-		None	Holocene intertidal mudflats
3.00-3.20	3813011	Light grey clay-silt	-		None	Holocene intertidal mudflats
-	3813012	Dark grey-brown peat	156 monolith,158		None	Reedy peat
3.55-4.10	3813013	Wood peat with shelly horizons at top of peat	156 monolith, 160-166		None	Holocene alder carr wetland
3.20-3.35	3813014	Light grey clay-silt	156 monolith		None	Holocene intertidal mudflats
3.35-3.50	3813015	Light brownish-grey clay-silt	157		None	Holocene intertidal mudflats
3.50-3.55	3813016	Light brown clay-silt	156 monolith, 159		None	Holocene intertidal mudflats
4.10-4.30	3813017	Light grey silty clay with gravel	156 monolith		None	Freshwater channel ?Holocene
4.30-4.65	3813018	Light brownish-grey silty clay with gravel	-		None	Freshwater channel ? Holocene
4.65-5.80	3813019	Grey silty clay with gravel	-		None	Freshwater channel ? Holocene

Zone 3: Valley Bottom Trench 3812TT

Trench No.	3812TT	Ground surface datum	3.47m O.D.	Co-ordinates	URL 41434.03E / 54177.84N	OS 561429.74E / 174178.87N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
-	3812001	Topsoil	-		None	
-	3812002	Made ground	-		None	
-	3812003	Made ground	202 column		None	
-	3812004	Silty peat	148		None	Holocene low energy upper tidal marsh?
-	3812005	Chalk pellets	-		None	
-	3812006	Grey clay-silt	149		None	Holocene intertidal mudflats
-	3812007	Grey clay-silt	150		None	Holocene intertidal mudflats
-	3812008	Dark brown peat	151		None	Reedy peat layer
-	3812009	Grey-brown clay silt	152		None	Alluvial clay
-	3812010	Light grey-green clay silt	153		None	Alluvial clay silt
-	3812011	Organic clay silt	154		None	Holocene low energy upper tidal marsh?
-	3812012	Blue-grey clay-silt	167		None	Holocene intertidal mudflats
-	3812013	Flint cobbles	168		None	Cobbles of flint forming man-made surface
-	3812014	Light grey-mid greeny brown silt clay	-		None	Disturbed silts filling channel
-	3812015	Clay-silt (infilling feature)	-		None	Fill of possible archaeological feature
-	3812016	Reed peat becoming wood peat with depth	169, 202 column		None	Holocene alder carr wetland becoming reedswamp upwards
-	3812017	Sandy-silt with organic matter	-		None	Holocene freshwater channel
-	3812018	Clay-silt with gravel clasts	-		None	Holocene freshwater channel
-	3812019	Dark brown peat	-		None	Reedy peat
-	3812020	Mid grey-green clay-silt with occasional flints	-		None	Pleistocene deposit
-	3812021	White silty gravel with chalk	-		None	Pleistocene gravel
-	3812022	Mid green clay-silt	-		None	Alluvium?
-	3812023	Flint gravel	-		None	Late Pleistocene braided channel

Zone 3: Valley Bottom Trench 3811TT

Trench No.	3811TT	Ground surface datum	3.11m O.D.	Co-ordinates	URL 41413.73E / 54227.47N	OS 561409.44E / 174228.50N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.20	3811001	Topsoil	-		None	
0.20-1.50	3811002	Made ground	-		None	
1.50-1.70	3811003	Peat	-		None	Holocene low energy upper tidal marsh?
1.70-2.00	3811004	Clay-silt	-		None	Holocene intertidal mudflats
2.00-2.20	3811005	Clay-silt	-		None	Holocene intertidal mudflats
2.20-2.35	3811006	Peat	-		None	Holocene low energy upper tidal marsh?
2.35-2.50	3811007	Clay-silt	-		None	Holocene intertidal mudflats
2.50-2.60	3811008	Clay-silt	-		None	Holocene intertidal mudflats
2.60-2.90	3811009	Clay-silt	-		None	Holocene intertidal mudflats
2.90-3.10	3811010	Clay-silt	-		None	Holocene intertidal mudflats
3.10-3.20	3811011	Clay-silt	-		None	Holocene intertidal mudflats
3.20-3.75	3811012	Peat	-		None	Holocene alder carr wetland
3.75-3.95	3811013	Light brownish grey silt-silt with organic material and burnt flints	-		None	Holocene intertidal mudflats with soil developed at top
3.95-5.10	3811014	Clay-silt	-		None	Holocene intertidal mudflats
5.10-6.50	3811015	Matrix supported flint gravel	-		None	Late Pleistocene braided channel

Zone 3: Valley Bottom Trench 3810TT

Trench No.	3810TT	Ground surface datum	3.03m O.D.	Co-ordinates	URL 41411.66E / 54204.94N	OS 561407.37E / 174205.96N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.20	3810001	Topsoil	-		None	
0.20-1.30	3810002	Made ground	-		None	
1.30-1.40	3810003	Peaty clay-silt	112, 125		CBM (1)	Holocene low energy upper tidal marsh?
1.40-1.50	3810004	Chalk	-		None	
1.50-1.60	3810006	Clay-silt	113		None	Holocene intertidal mudflats
1.60-1.70	3810007	Clay-silt	114		None	Holocene intertidal mudflats
1.70-1.80	3810008	Clay-silt	115		None	Holocene intertidal mudflats
1.80-1.90	3810009 3810010 3818011	Laminated peat and silt Laminated peat and silt Laminated peat and silt	126 column, 127 column, 130		CBM (1)	Holocene low energy upper tidal marsh?
1.90-2.05	3810012	Clay-silt	116, 126 column		Flint artefacts (4)	Holocene intertidal mudflats
2.05-2.20	3810013	Clay-silt	117, 127 column		None	Holocene intertidal mudflats
2.20-2.25	3810014	Organic clay-silt	118, 126 column, 127 column		None	Holocene low energy upper tidal marsh?
2.25-2.45	3810015	Grey clay-silt	119, 127 column		None	Holocene intertidal mudflats
2.45-2.50	3810016	Grey clay-silt	120		Flint artefact (1)	Holocene intertidal mudflats
2.50-2.65	3810017	Organic silt	121		None	Holocene channel
2.65-3.00	3810018	Wood peat	122, 128, 129		Wood (2)	Holocene alder carr wetland
3.00-3.15	3810019	Sandy-silt with organic material	123		None	Holocene freshwater channel cut-off
3.15-3.90	3810020	Sandy-clay	124		None	Holocene freshwater channel
3.90-4.65	3810021	Matrix supported gravel	-		None	Late Pleistocene braided channel
-	3810022	Post/stake, small find number 8	-		None	Wooden post/stake
4.65-5.35	3810023	Sandy-clay and gravel	-		None	Late Pleistocene braided channel

Zone 3: Valley Bottom Trench 3809TT

Trench No.	3809TT	Ground surface datum		Co-ordinates	URL 41386.46E / 54253.99N		OS 561382.17E / 174255.01N
Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**		**Interpretation**
-	3809001	Topsoil	-		None		
-	3809002	Made ground	-		None		
-	3809003	Friable peaty clay with reeds	131, 155 monolith		None		Holocene low energy upper tidal marsh?
-	3809004	Blue grey clay	132		None		Holocene intertidal mudflats
-	3809005	Grey-brown peaty clay	133		None		Holocene low energy upper tidal marsh?
-	3809006	Blue grey clay	134		None		Holocene intertidal mudflats
-	3809007	Light grey-brown silty peaty clay	135		None		Holocene low energy upper tidal marsh?
-	3809008	Light bluish clay with reeds	136		None		Holocene intertidal mudflats
-	3809009	Light grey-brown peaty clay with reeds	137		None		Holocene low energy upper tidal marsh?
-	3809010	Dark reddish brown woody peat	138, 140, 141, 142, 143, 144		None		Holocene alder carr wetland
-	3809011	Light greyish brown sandy-clay with roots	139		Flint artefacts (3), burnt flint (1)		Holocene freshwater channel
-	3809012	Light greyish-blue sandy-clay	155 monolith		None		Holocene freshwater channel

Zone 3: Valley Bottom Trench 3800TT

Trench No.	3800TT	Ground surface datum	3.94m O.D.	Co-ordinates	URL 41379.26E / 54205.36N	OS 561374.97E / 174206.39N
Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-0.20	3800001	Topsoil	-		None	
0.20-2.40	3800002	Made ground	-		None	
2.40-3.20	3800003	Mid-grey clay-silt. With some organics and peat remains	-		Flint artefact (1), bones (4)	Holocene saltmarsh surface
3.20-3.60	3800004	Pale grey clay-silt	-		None	Holocene intertidal mudflats
3.60-4.30	3800005	Mid orange brown clay-silt.	-		None	Holocene intertidal mudflats
4.30-4.80	3800006	Mid reddish-brown clast supported gravel.	-		None	Late Pleistocene high energy braided channels
4.80-5.20	3800007	Mid yellowish brown matrix supported gravel	-		None	Late Pleistocene high energy braided channels

Zone 3: Valley Bottom Trench 3799TT

Trench No.	3799TT	Ground surface datum	4.18m O.D.	Co-ordinates	URL 41370.18E / 54223.75N	OS 561365.89E / 174224.78N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.40	3799001	Topsoil	-		None	
0.40-2.40	3799002	Made ground	-		None	
-	3799003	Light grey orange silty clay with occasional flints	-		Flint artefacts (17)	Holocene low energy intertidal mudflat
-	3799004	Dark grey-brown silty clay with frequent inclusions of charcoal, burnt stone and flint	19		None	Spread of burnt material may be associated with pit 3799006
-	3799005-06	Cut 3799006, filled by 3799005	20		None	Possible pit cut
-	3799007	Dark brownish-grey humic silt.	-		None	Holocene saltmarsh surface
2.40-2.80	3799008	Light grey-brown silty-clay with orange streaks	-		None	Holocene low energy intertidal mudflat
2.80-	3799009	Light blue-grey silty clay with occasional flints.	-		None	Holocene low energy intertidal mudflat
-	3799010	Light blue-grey silty clay with occasional flints.	-		None	Holocene low energy intertidal mudflat
-	3799011	Very light greyish-brown silty clay	-		None	Holocene low energy intertidal mudflat
-		Gravel	-			Late Pleistocene braided channel environment

Zone 3: Valley Bottom Trench 3797TT (west end)

Trench No.	3797TT (1)	Ground surface datum	5.24	Co-ordinates	URL 41327.23E / 54254.28N	OS 561322.95E / 174255.31N	
Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**	
0.00-0.20		Topsoil	-		None		
0.20-2.00	3797001	Made ground	-		None		
2.00-3.00	3797002	Mid brown clay-silt	39		CBM (1)	Holocene colluvium	
-	3797003-04, 3797015	Cut of ditch 3797004, filled by 3797003 and 3797015	-	-	Glass (1), burnt flint (1)	Ditch	
3.00-3.10	3797005	Light grey clay-silt	40		Flint artefacts (9), burnt flint (7)	Holocene colluvium containing a developed soil horizon	
3.10-3.45	3797006	Silty-clay	41		None	Holocene colluvium	
3.45-3.55	3797007	Mid brown silty clay	42		None	Holocene colluvium containing a developed soil horizon	
3.55-3.70	3797008	Silty clay	43		Pot (3), flint artefacts (4)	Holocene colluvium containing a developed soil horizon	
3.70-3.75	3797009	Light silty clay	44		None	Holocene colluvium containing a developed soil horizon	
-	3797010-11	Cut of pit 3797011, filled by 3797010	46		None	Small pit	
3.75-4.45	3797012	Silty clay	-		None	Holocene intertidal mudflat	
3.75-5.25	3797013	Light brown bedded sand	45, 47		None	?Late Pleistocene colluvium or fluvial deposits	
3.15-3.75	3797014	Silty clay	-		None	Holocene intertidal mudflat	
5.25-6.35	3797016	Flint gravel	-		None	Late Pleistocene braided channel deposits	
N.B. this log comprises a combination of stratigraphic log sheets 2 and 4 for this trench, i.e. the western end of the trench							

Zone 3: Valley Bottom Trench 3796TT

Trench No.	3796TT	Ground surface datum	5.25m O.D.	Co-ordinates	URL 41326.68E / 54292.14N	OS 561322.40E / 174293.16N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
-	3796001	Topsoil	-		None	
-	3796002	Made ground	-		None	
-	3796003, 3796009-10	Dark grey fine silty-peat, contains 1 fragment of sliced timber 3796009 and 1 fragment of driftwood 3796010	12, 14		None	Holocene low energy upper tidal marsh?
-	3796004	Blue grey very fine silty-clay	4 7		Flint artefacts (2), burnt flint (2)	Holocene intertidal mudflats
-	3796005	Dark greenish-grey silty clay	8, 9, 10, 11		1 burnt flint	Holocene intertidal mudflats
-	3796006	Brown wood peat	-		None	Holocene ?alder carr wetland
-	3796007	Blue-grey fine silty-clay	5		None	Holocene intertidal mudflats
-	3796008	Greenish-black very fine silty peat	6		None	Holocene low energy upper tidal marsh?
-	3796011	Blue grey silty sand	-		None	Early Holocene freshwater channel
-	3796012	Dark bluish-grey sandy gravel	-		None	Late Pleistocene high energy braided channel environment

Zone 3: Valley Bottom Trench 3795TT

Trench No.	3795TT	Ground surface datum		Co-ordinates	URL 41297.65E / 54292.27N	OS 561293.37E / 174293.29N	
Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**	
0.00-3.80	3795001	Made Ground	-		None		
-	3795002	Light grey clay-silt	-		CBM (5), burnt flint (2)	Possibly a small channel	
3.80-4.50	3795003	Dark silty-peat	15		None	Holocene low energy upper tidal marsh?	
4.50-5.30	3795004	Pale olive-grey clay-silt with reeds	16		Flint artefacts (32), burnt flint (34)	Holocene intertidal mudflats	
5.30-5.60	3795005	Loose flint gravel	17		None	Late Pleistocene high energy braided channel environment	
5.60-6.00	3795006	Pale grey-green clay-silt with sand content appearing with depth	18		None	Late-Pleistocene braided channel environment	
6.00-6.60	3795007	Brown chalky sands and gravels	-		None	Late Pleistocene high energy braided channel environment	
6.60-7.00	3795008	Brown clay-silt with sand	-		None	Late Pleistocene cold climate solifluction	

Zone 3: Valley Bottom Trench 3794TT

Trench No.	**3794TT**	**Ground surface datum**	**4.85m O.D.**	**Co-ordinates**	**URL 41293.04E / 54314.51N**	**OS 561288.77E / 174315.53N**
Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-0.35	3794001	Topsoil	-		None	
0.35-3.40	3794002	Made Ground	-		None	
3.40-3.50	3794003	Peat	-		None	Holocene low energy upper tidal marsh?
3.50-4.00	3794004	Clay-silt	-		None	Holocene intertidal mudflats
4.00-4.50	3794004	Peaty-silt.	-		None	Holocene low energy upper tidal marsh?
4.50-4.75	3794004	Clay-silt	-		None	Holocene intertidal mudflats
4.75-5.00	3794004	Peaty-silt	-		None	Holocene low energy upper tidal marsh?
5.00-5.30	3794004	Clay-silt	-		None	Holocene intertidal mudflats
5.30-6.50	3794005	Wood peat	61, 62		Flint artefacts (2), 1 burnt flint	Mid-Holocene ?alder carr wetland
6.50-6.70	3794006	Silty-sand becoming coarser downwards	-		None	Early-Holocene freshwater channel
6.70-7.00	3794007	Sandy-gravel	-		None	Late Pleistocene high energy braided channel system

Zone 3: Valley Bottom Trench 3793TT

Trench No.	3793TT	Ground surface datum	4.32m O.D.	Co-ordinates	URL 41310.00E / 54333.93N	OS 561305.73E / 174334.95N

Depth (metres)	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00–0.40	3793001	Topsoil	-		None	
-	3793002	Made Ground	-		None	
-	3793003	Dark greyish-brown firm peaty clay.	-		None	Holocene low energy upper tidal marsh?
-	3793004	Mid bluish-grey fine silt.	-		None	Holocene intertidal mudflats
-	3793005	Light blue-grey silty-clay.	-		None	Holocene intertidal mudflats
-	3793006	Greyish-brown peaty-clay.	-		Bones (6)	Holocene low energy upper tidal marsh?
-	3793007	Mid greyish-brown silty-clay.	-		None	Holocene intertidal mudflats
-	3793008	Dark greyish-brown peaty-clay.	-		None	Holocene low energy upper tidal marsh?
-	3793009	Dark bluish-grey silty clay.	-		None	Holocene intertidal mudflats
-	3793010	Dark greyish-brown peaty-clay.	-		None	Holocene low energy upper tidal marsh?

Zone 2: Valley Side (South) 3829BTT

Trench No.	**3829B TT**	**Ground surface datum**	**5.70 m OD**	**Co-ordinates**	**URL 41344.25E / 54058.32N**	**OS 561339.97E / 174059.36N**

Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-0.10	3829010	Short turf and thin topsoil, worn bear in patches	-	-	None	Modern turf and topsoil
0.10-0.30	3829011	Mod. Compacted yellowish brown f-m sand, interdigitated with trails of underlying unit	-	-	None	Pleistocene solifluction
0.30-1.50	3829012	Firm, mod. Cemented in places, pale brown chalk diamict with common sub-angular to rounded m-vc flint pebbles and occ. Larger flint nodules and pieces up to 25cm size; larger flint nodules concentrated at base of unit, where associated with sub-horizontal sandy lenses; deposits interdigitated with overlying sand and gen. slumped to E	S.11-14	-	1 small flake/ blade	Pleistocene solifluction
1.50-2.50	3829013	White Chalk diamict with occ. flint nodules and chunks, no rounded flint pebbles	S.15	-	None	Pleistocene solifluction, grading into degraded Chalk bedrock

Zone 2: Valley Side (South) 3829ATT

Trench No.	3829A TT	Ground surface datum	4.66 m OD	Co-ordinates	URL 41384.83E / 54078.47N	OS 561380.55E / 174079.51N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.10	3829000	Turf and v. thin topsoil	-	-	None	Turf at foot of football pitch terrace
0.10-1.30	3829001	Layers of v. loose and v. coarse modern cbm, ash, clinker and v. chalky flint gravel dipping to south and unit thickening overall to N; basal layer of mod. Compacted silty sand containing occ. modern cbm c. 10cm thick dips to N following underlying surface	-	-	Flint artefacts (5)	20th C made ground, landraising old excavation to N for football pitch terrace
1.30-2.20	3829002	Weakly-mod. compacted yellowish brown fine sand with sl. contorted bands/lenses rich in chalk and flint gravel, and occ. more silty lenses; gen. dipping sl. N	145 S.1-3	-	1 Levallois flake 2 undiagnostic waste flakes	Pleistocene solifluction
2.20-4.00	3829003	Firm yellowish brown coarse silt/v. fine sand with sub-horizontal horizons of pale brown carbonate precipitation and occ. trails of f-m flint gravel	146, 147 S.4-7	-	3 undiagnostic waste flakes	Pleistocene solifluction, with acolian/colluvial input?
4.00-4.80	3829004	Well compacted, lightly cemented pale brown chalk diamict with frequent f-c flint pebbles; occurs as patch within bottom half of 3829003	S.8-9	-	None	Pleistocene solifluction
4.80-5.45 base not reached	3829005	Loose, mod. Sorted, clast supported m-vc chalk gravel with occ. flint nodules 5-15cm size in sl. sandy chalk silt matrix	S.10	-	None	Pleistocene fluvial or solifluction

Zone 2: Valley Side (South) 3808TT

Trench No.	3808TT	Ground surface datum	3.86 m OD	Co-ordinates	URL 41427.78E / 54085.77N	OS 561423.50E / 174086.81N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.20	3808001	Topsoil and turf	-	-	None	Topsoil and turf, surface of recent bowling green
0.20-0.30	3808002	Black ash and cinders mixed with chalk, thickens to 1m deep at S end trench, filling flat-based feature which crosses trench transversely - wooden railway sleeper visible in W-facing section	-	-	None	20th C ground levelling over late 19thC cement rail track, which continues to that in 3805 TT - both are E end of Spurrell's 1883 tramway cutting
0.30-1.90	3808003	Mod. firm and structureless yellowish brown sandy cl-silt, softening downward to sl. paler mod. soft sub-horizontally bedded f-m sands and silty sands containing occ. sub-angular to rounded f-c flint pebbles	-	-	None	Top part base of truncated Holocene colluvium/ploughzone grading down into bottom part which is Pleistocene floodplain
1.90-2.60	3808004	Mod. firm, poorly sorted matrix supported m-c flint gravel with mod. common flint nodules 15-25cm size; horizontal sharp erosive basal contact truncates both underlying units, which slope up to S	S.1 S.5	-	1 large flake 1 crude/ failed Levalloisian core	Late Pleistocene fluvial gravel, high energy braided channel, but not terminal Devensian
2.60-3.25	3808005	Mod. firm yellowish brown sandy cl-silt; 2-4mm thick sub-horiz. Laminations fine sands and silty sands in places	1 2	None	None	Pleistocene solifluction/cold climate colluvial deposition
3.25-3.75	3808006	Pale brown Chalk diamict with sub-angular to rounded f-c flint pebbles and occ flint nodules (5-20cm), whole and broken; trails of deposit heavily interdigitated with overlying sandy cl-silt, and slumped to N	S.2-4	-	None	Pleistocene solifluction

Trench No.	3807TT	Ground surface datum	3.54 m OD	Co-ordinates	URL 41412.78E / 54116.92N	OS 561408.49E / 174117.95N	
Depth	**Context Number**	**Description of unit**		**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
-	3807039-41	Cut of ditch 3807039, filled by 3807040, 3807041		-	-	Pot (1), flint artefacts (2)	Ditch, dated mid 2nd century+
-	3807042-43	Cut of ditch 3807043 (same as 3807011), filled by 3807042		-	-	None	Ditch, Roman?
-	3807044-45	Cut of ditch 3807044, filled by 3807045		-	-	Pot (1)	Ditch, dated 2nd century
-	3807048-52	Cut of ditch 3807052 (same as 3807034), filled by 3807048, 3807049, 3807050, 3807051		85	-	CBM (4), pot (54), bones (7), flint artefacts (2), iron (2)	Ditch, dated 2nd century
-	3807053-57	Cut 3807056, filled by 3807053, 3807054, 3807055, 3807056		-	-	Pot (23), bones (3)	Curvilinear cut, possibly ditch terminus or pit. Roman?
1.40-1.85	3807004	Friable, mod. Compacted strong brown sandy clay-silt with occ. f-c flint pebbles and Mn flecking		-	-	None	Pleistocene colluvial or floodplain deposition
1.85-2.85	3807058	Flint gravel; large well-rolled blue-white stained nodules 10-15cm size at top surface; rest of unit is structureless and has m-vc flint pebbles in stiff sl. cl-silty sand matrix with. occ. larger flint nodules 10-15cm size		S.1-4	-	1 undiagnostic flake	Pleistocene high energy fluvial deposition, possible coarser lag at top junction (blue-white staining suggests exposure as landsurface??) Or Pleistocene solifluction?
2.85-3.25	3807059	Soft to mod. Compacted yellowish brown f-m cl-silty sand		105	-	None	Pleistocene fluvial deposition, quieter phase, possibly v. short-lived? Or Pleistocene solifluction?
3.25-4.45 base not reached	3807060	Mod. loose, poorly sorted f-c flint gravel with occ. flint nodules 15-20cm size in sl. silty sand matrix with occ. Pockets of soft, light yellowish brown slightly silty f-m sand; no bedding structures		S.5-9	-	None	Pleistocene fluvial deposition, variable high-low energy? Or Pleistocene solifluction?

Zone 2: Valley Side (South) 3807TT

Trench No.	3807TT	Ground surface datum	3.54 m OD	Co-ordinates	URL 41412.78E / 54116.92N	OS 561408.49E / 174117.95N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.40	3807001	Topsoil and turf	-	-	None	Topsoil and turf
0.40-1.00	3807002	Stiff yellowish brown sandy cl-silt	-	-	None	Post-Roman colluvial or floodplain deposition
1.00-1.40	3807003	Stiff sandy clay silt, similar to above, but darker and grayer	-	-	CBM (81), fired clay(1), pot (11), flint artefacts (4), bones (6), 1shell	Post-Roman colluvial or floodplain deposition
-	3807005-6	Cut of ditch 3807006, filled by 3807005	-	-	None	Ditch
-	3807007-10, 3807015-16	Cut of ditch 3807010, filled by 3807007, 3807008, 3807009, 3807015, 3807016	-	-	CBM (4), pot (6), stone (1), shell (12)	Ditch, dated 2nd century
-	3807011, 3807017	Cut of ditch 3807011, filled by 3807017	-	-	None	Ditch
-	3807012-14	Linear cut 3807012, filled by 3807013-14	-	-	None	Linear feature
-	3807018-23	Cut of ditch 3807021, filled by 3807018, 3807019, 3807020, 3807022, 3807023	86	-	Flint artefacts (5), CBM (74), bones (3), pot (28), 1 shell, 1cu alloy brooch	Ditch, dated mid-late 1st century
-	3807024, 3807046-47	Cut of linear gully 3807046 (same as 3807012) filled by 3807024, 3807047	-	-	CBM (1), pot (2), flint artefacts (15), burnt flint (2)	Gully, dated 2nd century +
-	3807025-26	Cut of post-hole 3807025, filled by 3807026	-	-	CBM (1), flint artefact (1), shell (2)	Post-hole
-	3807027-28	Cut of linear gully 3807028, filled by 3807027	-	-	Pot (5), bones (1), shell (3)	Linear gully, possibly beam slot
-	3807029, 3807032-33	Cut of ditch 3807032 (same as 3807010), filled by 3807029, 3807033	-	-	None	Ditch, Roman?
-	3807030-31	Cut of ditch 3807030, filled by 3807031	-	-	CBM (3), pot (9), flint artefacts (3), bone (1)	Ditch, dated late 2nd century +
-	3807034-35	Cut of ditch 3807034 (same as 3807052), filled by 3807035)	-	-	Pot (1)	Ditch, dated mid 2nd century +
-	3807036-38	Cut of gully 3807036, filled by 3807037, 3807038	-	-	Pot (9)	Gully, dated 2nd century

Zone 2: Valley Side (South) 3806TT

Trench No.	3806TT	Ground surface datum	3.67 m OD	Co-ordinates	URL 41402.10E / 54163.51N	OS 561397.82E / 174164.55N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.25	3806001	Asphalt	-	-	None	Tarmac tennis court
0.25-1.05	3806002	Mod. Compacted friable yellowish brown sl. Silty fine sand; occ. f-m flint pebbles and chalk flecks in top part; grades down into 3806003	-	-	None	Holocene colluvium
-	3806006-7	Cremation urn in small pit, cut and fill	3		None	Roman-B (?) cremation urn
1.05-1.70	3806003	Mod.-well compacted yellowish brown sl. sandy cl-silt, structureless	-	-	CBM (11), pot (4), stone (2), 1 slag, burnt flint (22), flint artefacts (14)	Disturbed Pleistocene floodplain, interspersed with colluvial/aeolian sedimentation
1.70-2.85	3806004	Mod. soft, yellowish brown/brownish yellow sub-horizontally bedded m-c sands, occ. sl. Silty, with trails f-m flint gravel, esp. towards base	-	-	None	Pleistocene fluvial sands, decreasing energy
2.85-4.00	3806005	Loose, clast supported mod. sorted m-vc flint gravel, clasts gen. sub-angular to well rounded flint pebbles	S.1	-	1 flint artefact	Pleistocene fluvial gravel, high energy,
-	3806006	Cut for cremation vessel	-	-	None	Cut for cremation
-	3806007	Fill of cut 8306006	3	-	Contains burnt/cremated remains and fragments of cremation vessel	Fill of cremation

Zone 2: Valley Side (South) 3805TT

Trench No.	3805TT	Ground surface datum	4.80 m OD	Co-ordinates	URL 41393.11E / 54055.40N	OS 561388.82E / 174056.45N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.30	3805001	Topsoil and turf	-	-	None	Topsoil and turf
0.30-1.50	3805002	Loose and friable, yellowish-red to yellowish brown, mixed sands, silty sands and flint gravel	-	-	None	20th C made ground, tennis court levelling
-	3805003-4	Rail-track cutting and chalk-gravel fill with occ. *in situ* wooden sleepers	-	-	None	Temp. cement railway; this is Spurrell's tramway cutting, eastern end
1.50-1.80	3805005	Mod.-well compacted sl. silty f-m sand, strong brown, grades down into 3805006	-	-	None	Floodplain/colluvium? Prob. Pleistocene, maybe Holocene if colluvium
1.80-2.30	3805006	Weakly-mod. compacted structureless med. sand, brownish yellow with reddish yellow mottling	-	-	None	Floodplain/colluvium? Prob. Pleistocene, maybe Holocene if colluvium
2.30-2.55	3805007	Stiff, w-sorted f-c flint gravel in cl-silty sand matrix; band of coarser clasts at top of unit, and seam of silty f-m sand 5-10cm thick in top part; deposits dip slightly S	74 S.1-3	-	Contains 1 Levalloisian flint artefact, large blade found *in situ* lying horizontally towards base of gravel unit	Prob. Pleistocene minor fluvial channel deposits, possibly solifluction/colluvial
2.55-2.75	3805008	V. stiff yellowish brown sandy cl-silt with black Mn flecks and occ. sub-angular to rounded vf-m flint pebbles	75, 78 monolith	-	None	Prob. Pleistocene colluvial deposits, possibly incorporating loessic levels, possibly palaeo-landsurface within these units, pending analysis of monolith (sample 78)
2.75-2.85	3805009	Mod. soft, sl. Sticky, yellow to brownish yellow sl. Sandy cl-silt; upper surface slopes slightly up to N, and unit gen. thickens N	76, 78 monolith	-	None	
2.85-3.00	3805010	Mod. Compacted, friable brownish yellow sl. Silty f-m sand; fine sub-horizontal lam's 1-2mm thick	77, 78 monolith	-	None	
3.00-5.50	3805011	Stiff sandy cl-silt with seam of f-c flint gravel at top junction, gen. colour yellowish brown, getting paler downward, and contains patch of chalk and flint gravel	79, 80, 81 S.4-8	-	1 large flake	Pleistocene colluvium with occ. solifluction deposits interspersed
5.50-6.00 base not reached	3805012	Pale brown Chalk diamict with rounded flint pebbles and occ flint nodules, whole and broken	S.9	-	None	Pleistocene solifluction

Zone 2: Valley Side (South) 3802TT

Trench No.	3802TT	Ground surface datum	6.99 m OD	Co-ordinates	URL 41363.86E / 54138.21N	OS 561359.58E / 174139.24N
Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-5.30	3802001	Topsoil and turf overlying steeply dipping layers (45° to S) 10-40cm thick chalk cobbles, sands, modern cbm ash and tarmac	-	-	None	Mod. turf and topsoil over 20th C made ground, levelling terrace for football pitch
5.30-5.80 base not reached	3802002	Mod.-well compacted yellowish brown v. sandy cl-silt with occ. f-c sub-angular to rounded flint pebbles	-	-	None	Colluvium, prob. Pleistocene but maybe Holocene

Zone 2: Valley Side (South) 3803TT

Trench No.	3803TT	Ground surface datum	7.66 m OD	Co-ordinates	URL 41351.00E / 54082.03N	OS 561346.72E / 174083.07N
Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-4.30	3803001	Topsoil and turf overlying dipping layers of chalk pebbles and cobbles, brownish-yellow sands, modern cbm, ash and tarmac	-	-	None	Mod. turf and topsoil over 20th C made ground, levelling terrace for football pitch
4.30-5.30	3803002	Mod.-well compacted pale brown Chalk diamict, slightly cemented, with rounded flint pebbles and occ flint nodules, whole and broken; contains involuted pockets of yellowish brown silty sand	-	-	None	Truncated Pleistocene solifluction

Zone 1 - Valley Side (North) Trench 3804TT

Trench No.	3804TT	Ground surface datum	3.39 m OD	Co-ordinates	URL 41232.20E / 54479.40N		OS 561227.93E / 174480.41N
Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**		**Interpretation**
0.00-0.30	3804001	Modern turf and topsoil	-	-	None		Modern turf and topsoil
0.30-1.05	3804002	Friable sl. Silty sand with occ. f-m flint pebbles, yellowish brown	-	-	None		Holocene colluvium
1.05-2.80	3804003	Soft-mod. compacted brownish yellow/yellowish brown f-m sand with sub-horizontal bands of carbonate leaching and trails of f-m flint gravel	S.1 S.2	None	None		Pleistocene colluvium
2.80-4.30 base not reached	3804004	Soft and loose, poorly sorted vf-vc chalk and flint gravel, clasts gen sub-angular to rounded, in pale yellow silty f-m sand matrix, with occ. flint nodules, whole and broken	S.3 S.4	None	None		Pleistocene solifluction

Zone 2: Valley Side (South) 3798TT

Trench No.	3798TT	Ground surface datum	6.90 m OD	Co-ordinates	URL 41334.60E / 54199.50N		OS 561330.32E / 174200.53N
Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**		**Interpretation**
0.00-0.20	3798001	Topsoil and turf	-	-	None		Topsoil and turf
0.20-4.80	3798002	Steeply dipping layers 10-40cm thick chalk cobbles, sands, modern cbm ash and tarmac	-	-	None		20th C made ground, levelling terrace for football pitch
4.80-5.75 base not reached	3798003	Soft, yellowish brown sl. silty fine sand	-	-	None		Truncated colluvium, prob. Pleistocene but maybe Holocene

Zone 1 - Valley Side (North) Trench 3801TT

Trench No.	3801TT	Ground surface datum	5.28 m OD	Co-ordinates	URL 41210.28E / 54479.51N	OS 561206.01E / 174480.51N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.30	3801001	Turf and topsoil	-	-	None	Modern turf and topsoil
0.30-0.80	3801002	Friable strong brown v. sandy cl-silt with occ. f-m sub-angular to rounded flint pebbles	-	Occ. charcoal frag's - not sampled	None	Subsoil, Holocene colluvium
0.80-1.10	3801003	Mod.-well compacted orange-brown cl-silty f-m sand with occ. f-m rounded flint pebbles, sl. friable	-	-	None	Holocene colluvium
1.10-2.75	3801004	Mod. Compacted, uncohesive brownish yellow f-m sand, sub-parallel laminated, with occ. Beds of calc. precipitation and fine gravel trails, dipping and thickening SE	S.1	-	None	Pleistocene colluvium
2.75-3.05	3801005	V. poorly sorted m-vc flint gravel in sl. silty f-m yellowish brown sand matrix with flint nodules 15-25cm size and beds 5-10cm thick of f-vc chalk pebbles, dipping and thinning SE	S.2	-	None	Pleistocene solifluction
3.05-4.30 base not reached	3801006	Pale brown Chalk diamict with rounded flint pebbles and occ flint nodules, whole and broken	S.3 S.4	-	None	Pleistocene solifluction

Zone 1 - Valley Side (North) Trench 3791TT

Trench No.	3791TT	Ground surface datum	5.90 m OD	Co-ordinates	URL 41267.29E / 54363.76N	OS 561263.02E / 174364.77N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.30	3791001	Topsoil and turf	-	-	None	Topsoil and turf
0.30-4.00	3791002	Dipping layers 10-40cm thick chalk cobbles, yellowish brown sands, modern cbm, ash and tarmac pieces	-	-	None	20th C made ground, backfilling and levelling natural dry valley
4.00-4.10 base not reached	3791003	Soft, yellowish brown v. sandy cl-silt with some flint pebbles	-	-	None	Holocene colluvium

Zone 1 - Valley Side (North) Trench 3790TT

Trench No.	**3790TT**	**Ground surface datum**	**4.15 m OD**	**Co-ordinates**	**URL 41254.88E / 54385.52N**	**OS 561250.61E / 174386.53N**

Depth	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**
0.00-0.25	3790001	Turf and topsoil	-	-	None	Turf and topsoil
0.25-0.85	3790002	Strong brown sandy and gravely cl-silt	-	-	None	Pleistocene colluvium
0.85-1.65	3790003	Mod. Compacted yellowish brown cl-silty sand with greenish gray mollusc-rich patch, dipping and thickening downslope to E	29, 30, 31, 32, 33, 34, 35, 36	Abundant molluscs in isolated patch, sampled as vertical series at c. 10cm interval	None	Pleistocene colluvium
1.65-2.95	3790004	Mod. soft and friable yellowish brown cl-silty sand with pinkish gray clayey lenses at base	26	None	None	Pleistocene colluvium
2.95-3.30	3790005	Mod. Compacted yellowish brown v. sandy cl-silt with occ. nodular carbonate conc's	21, 22	None	None	Pleistocene floodplain
3.30-3.90	3790006	Mod. Compacted to firm gravely sand with sub-parallel lam'sf/m sand towards base and occ. beds 1-2cm thick of fine gravel	23, 24, 25, 28	None	None	Pleistocene fluvial
3.90-4.00	3790007	Loose, mod. Well sorted clast-supprted f-c flint gravel (clasts gen. sub-angular to well-rounded) thickens NE, pinches out to W	S.1 27	-	None	Pleistocene fluvial, higher energy main channel
4.00-4.40 base not seen	3790008	Pale brown Chalk diamict with rounded flint pebbles and occ flint nodules, whole and broken	-	-	None	Pleistocene solifluction

Zone 1 - Valley Side (North) Trench 3789TT

Trench No.	3789TT	Ground surface datum	3.89 m O.D.	Co-ordinates	URL 41274.28E / 54394.90N	OS 561270.01E / 174395.92

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.40	3789001	Topsoil and turf	-	-	None	Topsoil
0.40-0.75	3789002	Friable sandy cl-silt with occ. f-c flint pebbles and layers 6cm thick rich in vf-m chalk pebbles at top and base	-	-	1 flint artefact	Holocene colluvium
-	3789003	Cut of linear feature	-	-	None	Linear arch. feature
-	3789004	Primary fill of 3789003	-		1 flint artefact, burnt flint (20)	Fill of linear feature
-	3789005	Secondary fill of 3789003	-		None	Fill of linear feature
-	3789006	Cut of post-hole	-		None	Post-hole
-	3789007	Fill of 3789006	-		None	Fill of post-hole
0.75-1.05	3789008	Friable sandy cl-silt with common f-c flint pebbles, gen. orangey brown with some iron pan development	-	-	None	Holocene colluvium
1.05-1.80	3789009	Mod. Compacted sl. sandy cl-silt with occ. gravely patches, yellowish red	-	-	None	Holocene colluvium
1.80-2.40	3789010	Dense & compact sl. sandy cl-silt with occ. sandy and gravelly patches, yellowish red	-	-	None	Pleistocene colluvium
2.40-3.20	3789011	Yellowish brown silty fine sand with lenticular beds f-m sand, pink carbonate bands and occ. nodular carbonate conc's; occ. f-m gravel patches	63	Mollusc frag's seen	None	Pleistocene colluvium
3.20-4.75	3789012	Yellowish brown sl. sandy silt, gen. soft and unconsolidated, with occ. f-m rounded flint pebbles	64, 67 monolith, 68	-	None	Pleistocene colluvium
4.75-4.90	3789013	Mod. firm, mottled greenish grey/brownish yellow sl. sandy silt with common sub-angular f-m flint pebbles, dipping SE	65, 67 monolith	Abundant Pleist. molluscs seen	None	Pleistocene: colluvium/floodplain/fluvial?
4.90-5.00	3789014	Mod. firm sl. sandy silt with occ. fine angular flint pebbles, pinkish brown with str. Brown mottles	67 monolith,69	Occ. moll. frag's	None	Pleistocene: colluvium/floodplain?
5.00-6.20 base not reached	3789015	Yellow silt coarsening downward to yellowish brown sandy silt and fine sand; common nodular carbonate conc's at top	66, 70	-	None	Pleistocene colluvium/floodplain?

Zone 1 - Valley Side (North) Trench 3787TT

Trench No.	3787TT	Ground surface datum	3.70 m OD	Co-ordinates	URL 41256.27E / 54430.79N	OS 561252.00E / 174431.80N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.30	3787001	Topsoil and turf	-	-	None	Topsoil and turf
0.30-1.35	3787002	Mod.-well compacted and structureless sandy clay-silt/clay-silty sand with freq f-c flint pebbles and occ. chalk and charcoal flecks, gen. dark brown	-	Charcoal frag's seen, but not sampled	Flint artefacts (2)	Holocene colluvium
1.35-1.45	3787003	Mod.-well compacted layer of sandy clay-silt with charcoal flecks and freq. sub-angular vf-m chalk pebbles, gen. colour yellowish brown	50	Charcoal frag's seen, but not sampled	None	Holocene colluvium, base of plough zone??
1.45-2.00	3787004	Mod. compact and structureless sandy silt/silty sand with common f-c angular to sub-angular flint pebbles, flecks of black Mn staining	49 monolith	Charcoal frag's seen, but not sampled	Pot (2)	Holocene colluvium. Pottery dated late Neolithic, early Bronze Age
2.00-2.20	3787005	Mod. firm sl. Sandy silt with occ. f-m flint pebbles, yellowish red	49 monolith	-	None	Pleistocene: colluvium?
2.20-2.30	3787006	Mod. loose sand with gravely patches, gen. brownish yellow	49 monolith	-	None	Pleistocene: colluvium?
2.30-2.63	3787007	Mod. compacted and cohesive sl. sandy clay-silt, yellowish red	49 monolith	-	None	Pleistocene: colluvium?
2.63-2.74	3787008	Mod. loose and unconsolidated sl. silty fine sand with thin layer f-m flint gravel at top of unit, gen. strong brown	49 monolith	-	None	Pleistocene: colluvium?
2.74-6.25 base not reached	3787009	Mod. soft fine sand, brown, fine sub-parallel laminations in places dipping downslope to E, with occ. well-developed carbonate precipitation along lam. plane, and occ. fine gravel trails	49 monolith 51, 52 S.1-2	-	None	Pleistocene: colluvium?

Zone 1 - Valley Side (North) Trench 3785TT

Trench No.	3785TT	Ground surface datum	2.94 m O.D.	Co-ordinates	URL 41245.62E / 54462.94N	OS 561241.35E / 174463.94

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.20	3785001	Turf and topsoil	-	-	None	Current topsoil with turf and occ. shrubs
0.20-1.90	3785002	Friable sl. silty sand, mid-brown, with mod. common flint pebbles and fine chalk gravel	-	-	None	Holocene colluvium
1.90-3.10	3785003	Organic rich clay-silt with reed frag's, charcoal flecks, peat-rich horizons, and layer of intermittent blue-white flint cobbles	-	Visible reed and plant frag's, charcoal, occ. moll's, but not sampled for here	None	Holocene alluvium
3.10-3.70	3785004	V. friable wood peat, rich brown and strong sulphurous smell	-	Visible wood	None	Mid-Holocene Carr wetland
3.70-4.90	3485005	Soft, sl. silty f-m sand, blueish/greenish gray with occ sub-vertical reed frag's 2-3mm diameter	-	Visible reed frag's	None	Early-mid Holocene freshwater channel with reeds, silting up and stagnating
4.90-5.40	3785006	Soft, sl. silty f-c chalk-rich sand, pale blueish/greenish gray, coarsening and paler downward with increasingly common f-m Chalk pebbles	-	-	None	Early Holocene higher energy freshwater channel

Zone 1 - Valley Side (North) Trench 3784TT

Trench No.	3784TT	Ground surface datum	8.10 m OD	Co-ordinates	URL 41181.14E / 54492.72N	OS 561176.87E / 174493.73N

Depth	Context Number	Description of unit	Samples	Associated palaeoenvironmental material	Associated archaeological material	Interpretation
0.00-0.30	3784001	Turf and topsoil	-	-	None	Current topsoil
0.30-1.25	3784002	Loose, f-m flint gravel in m-c sandy matrix; occ. f-m sub-angular chalk pebbles towards base, as well as patches of lightly cemented chalk silt with large and well-rounded flint pebbles and cobbles; sub-horizontal lenses of silty sand towards base, slightly contorted at basal junction	S.1-3	-	None	Pleistocene solifluction
1.25-1.90	3784003	F-m sands with wavy sub-horizontal calcareous silty laminations, increasingly silty and finely laminated towards base; gen. colour brownish yellow with reddish yellow and light yellowish brown lam's; upper part moc. distorted at junction with overlying unit	S.4	-	None	Pleistocene fluvial floodplain
1.90-2.20	3784004	Loose, m-c sandy flint gravel	S.5	-	None	Pleistocene fluvial
2.20-2.90	3784005	Coarse, cross-bedded shelly (Tertiary frag's) sand	-	-	None	Pleistocene fluvial
2.90-3.90	3784006	Horizontally bedded coarse and very coarse beds of sandy flint gravel	S.6-7 48 (for clast lithology)	-	None	Pleistocene fluvial (high energy)
3.90-4.60	3784007	Pale brown Chalk diamict with Tertiary flint pebbles	S.8	-	None	Pleistocene solifluction
4.60-5.00	3784008	Poorly sorted coarse chalk and flint gravel	S.9	-	None	Pleistocene solifluction
5.00-5.45	3784009	Pale brown Chalk diamict with Tertiary flint pebbles	-	-	None	Pleistocene solifluction
5.45-5.65	3784010	White Chalk diamict with occ. flint nodules and chunks	-	-	None	Pleistocene solifluction, grading into degraded Chalk bedrock

Zone 1 - Valley Side (North) Trench 3783TT

Trench No.	3783TT	Ground surface datum	4.64 m O.D.	Co-ordinates	URL 41218.61E / 54514.62N	OS 561214.34E / 174515.62N	
Depth (metres)	**Context Number**	**Description of unit**	**Samples**	**Associated palaeoenvironmental material**	**Associated archaeological material**	**Interpretation**	
0.00-0.25	3783001	Turf and topsoil	-	-	None	Topsoil	
0.25-0.35	3783002	Strong brown clay-silt, structureless and massive, with common m-c flint pebbles	-	-	None	Holocene colluvium	
0.35-0.80	3783003	Brownish yellow f-m sand with common flint pebbles (1-10cm), and occasional patches of calcareous	-	-	None	Pleistocene solifluction	
0.80-1.40	3783004	Yellowish brown, mod. compacted slightly silty f-m sand; faint remnant bedding throughout unit, and occ. lenticular lenses of m-c sand; unit pinches out either side of logged location	-	-	None	Short-lived stream channel	
1.40-1.75	3783005	Brownish yellow sandy flint gravel with chalk-rich patches; gravel varies from well f-vc flint pebbles in sandy matrix to clast supported patches of poorly sorted flint pebbles and cobbles; matrix gen. rich in Tertiary shell frag's; unit is gen. coarsely bedded with parallel, tabular sheets 10-15cm thick dipping down slope, occ. convoluted by slumping	S.1-5	-	2 flint artefacts	Pleistocene solifluction	
1.75-3.80	3783006	Chalk diamict with rounded flint pebbles	-	-	None	Pleistocene solifluction	

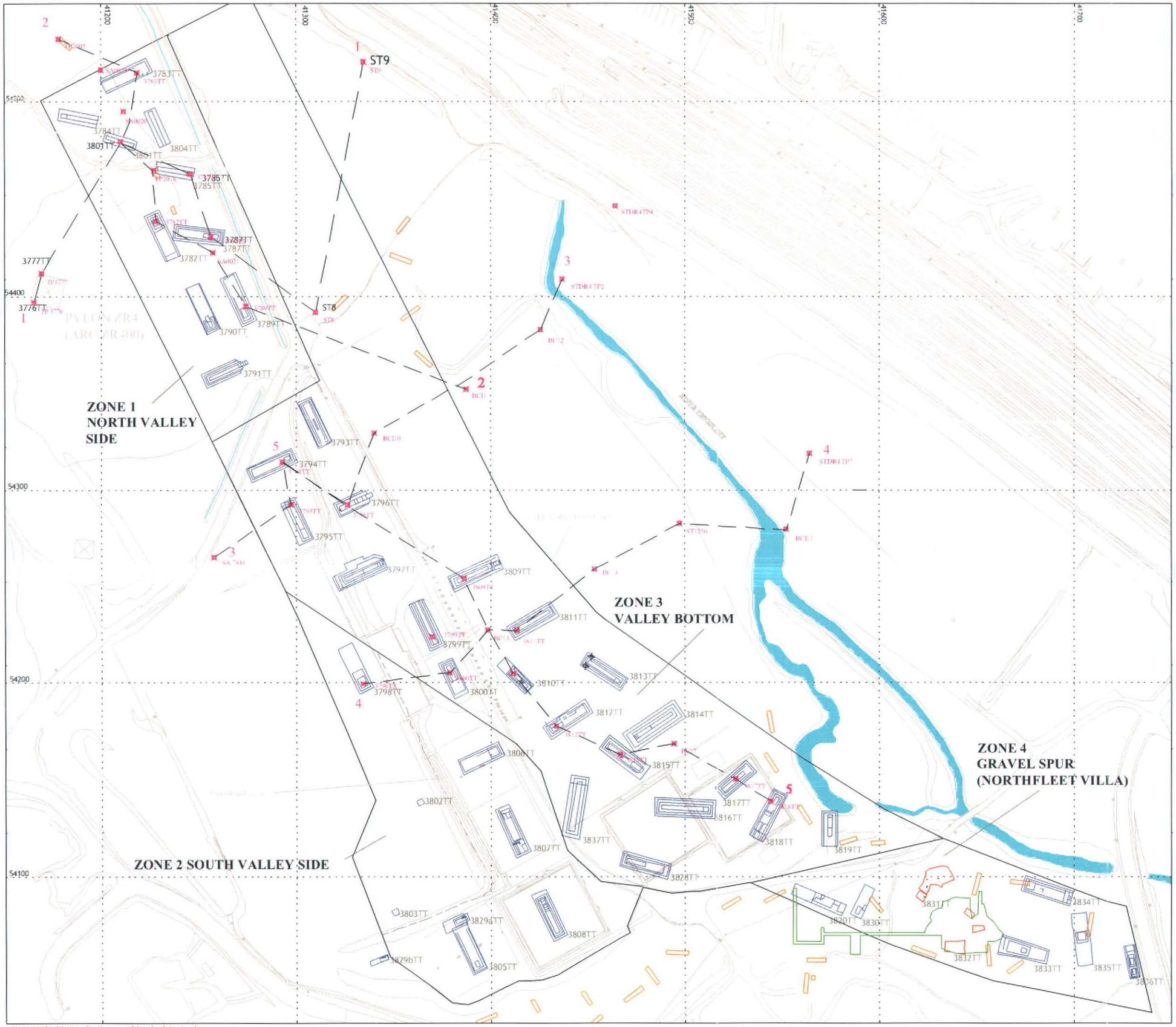
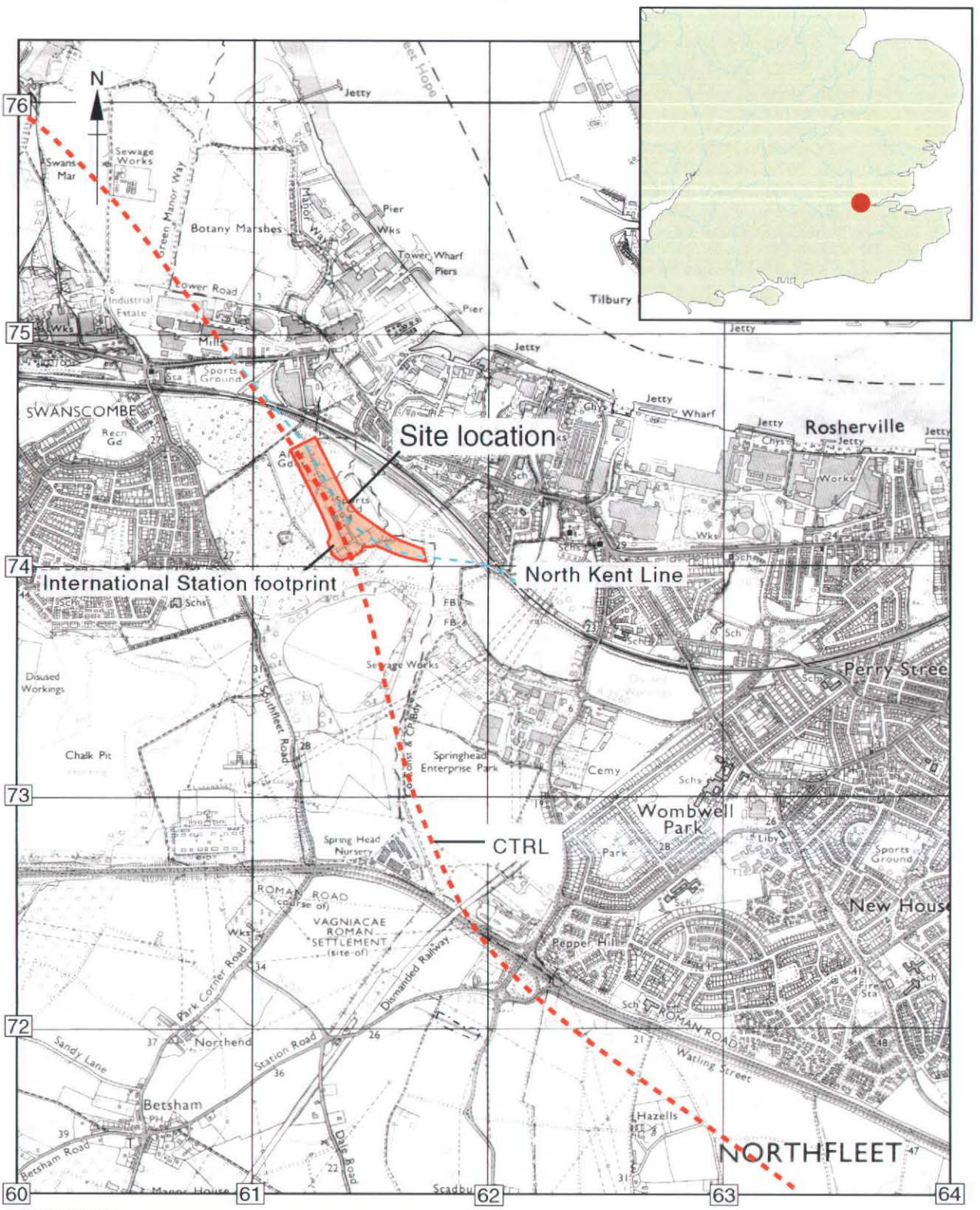


Figure 2: Trench Location Plan (showing locations of geological cross-sections)



Scale 1:25,000

Figure 1: Site location.

scale is wrong - should have been 1:50

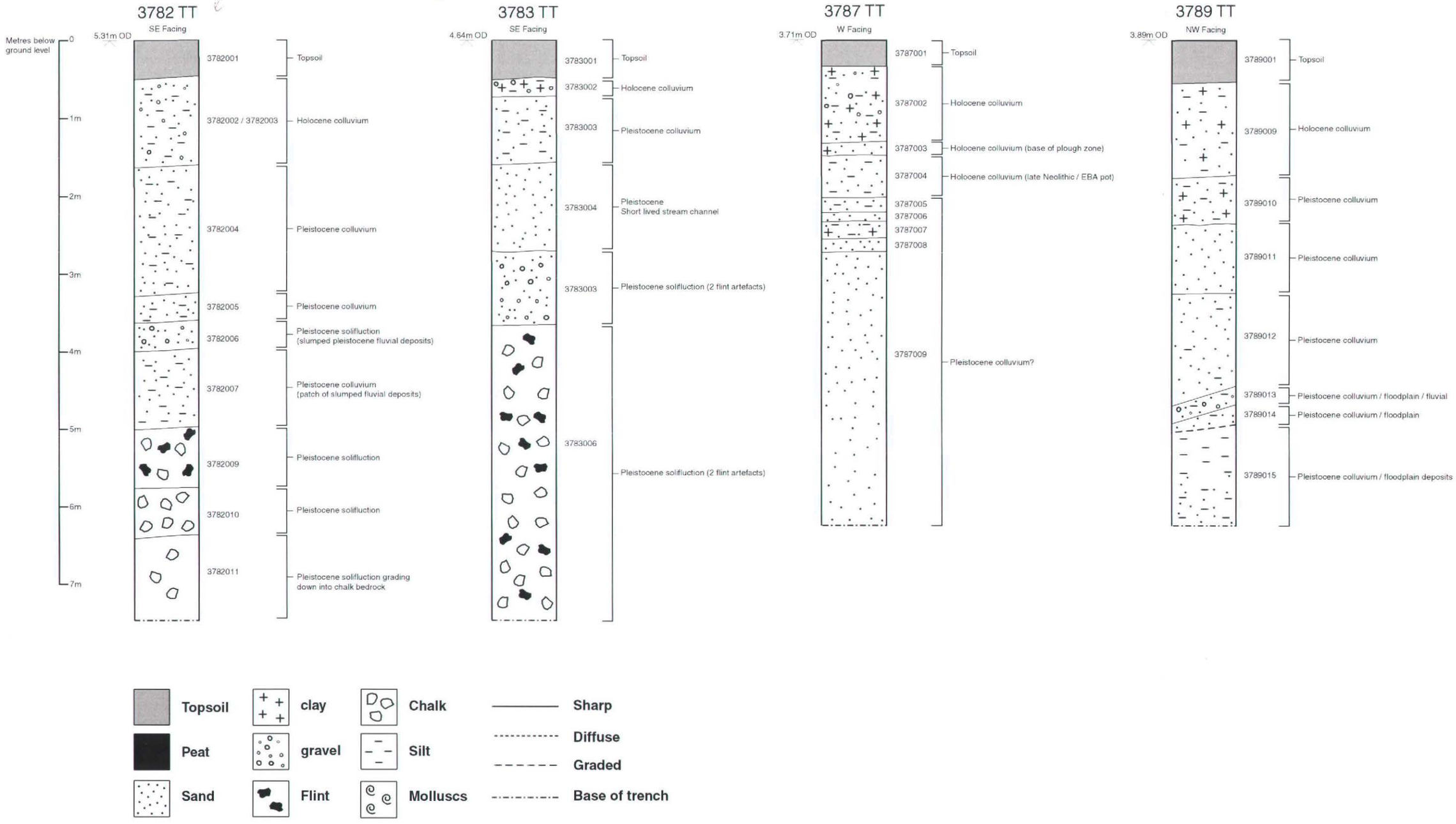


Figure 3: Zone 1, Trench logs 3782TT, 3783TT, 3787TT, 3789TT

scale is wrong

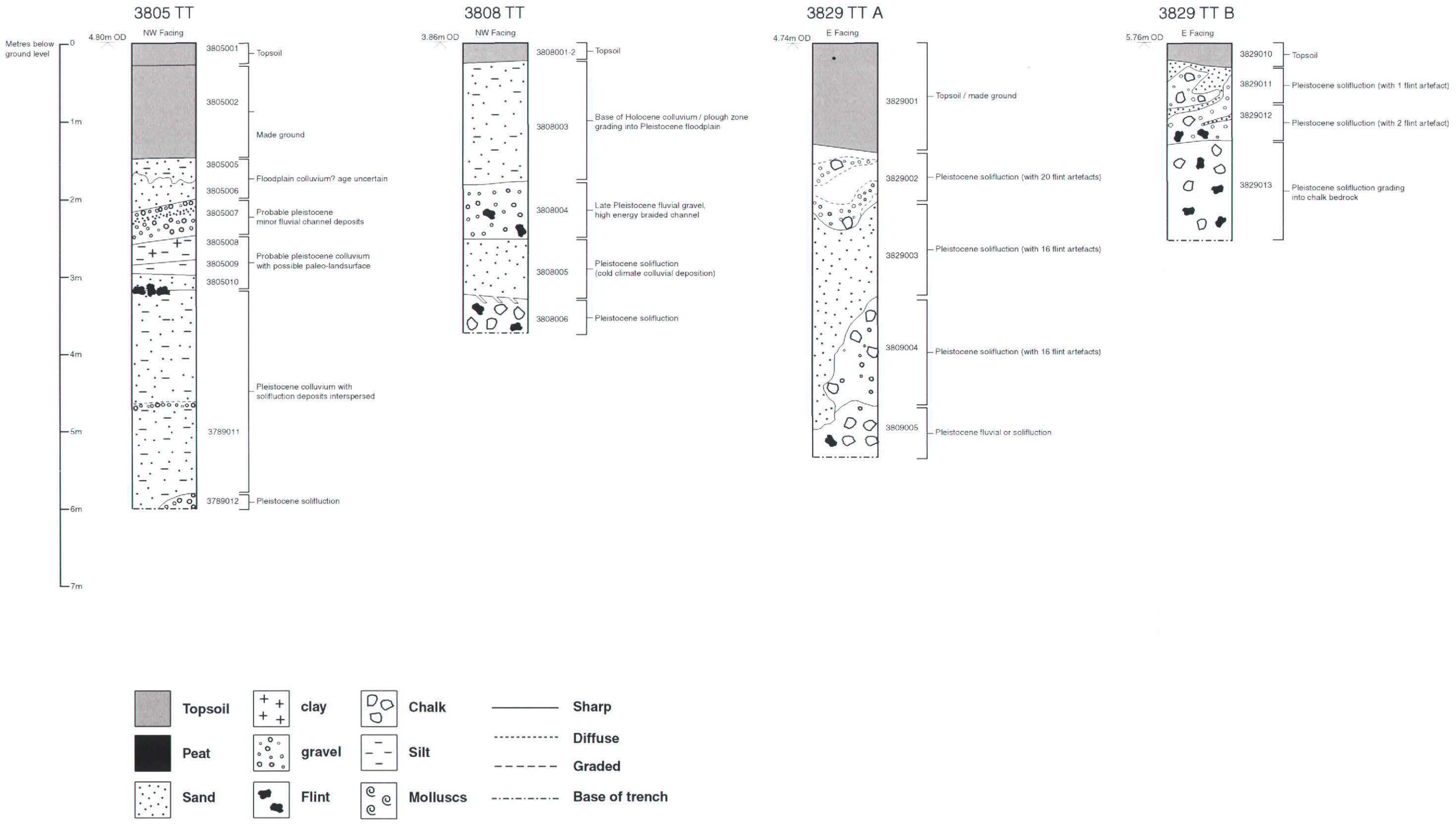


Figure 4: Zone 2, Trench logs 3805TT, 3808TT, 3829TT,

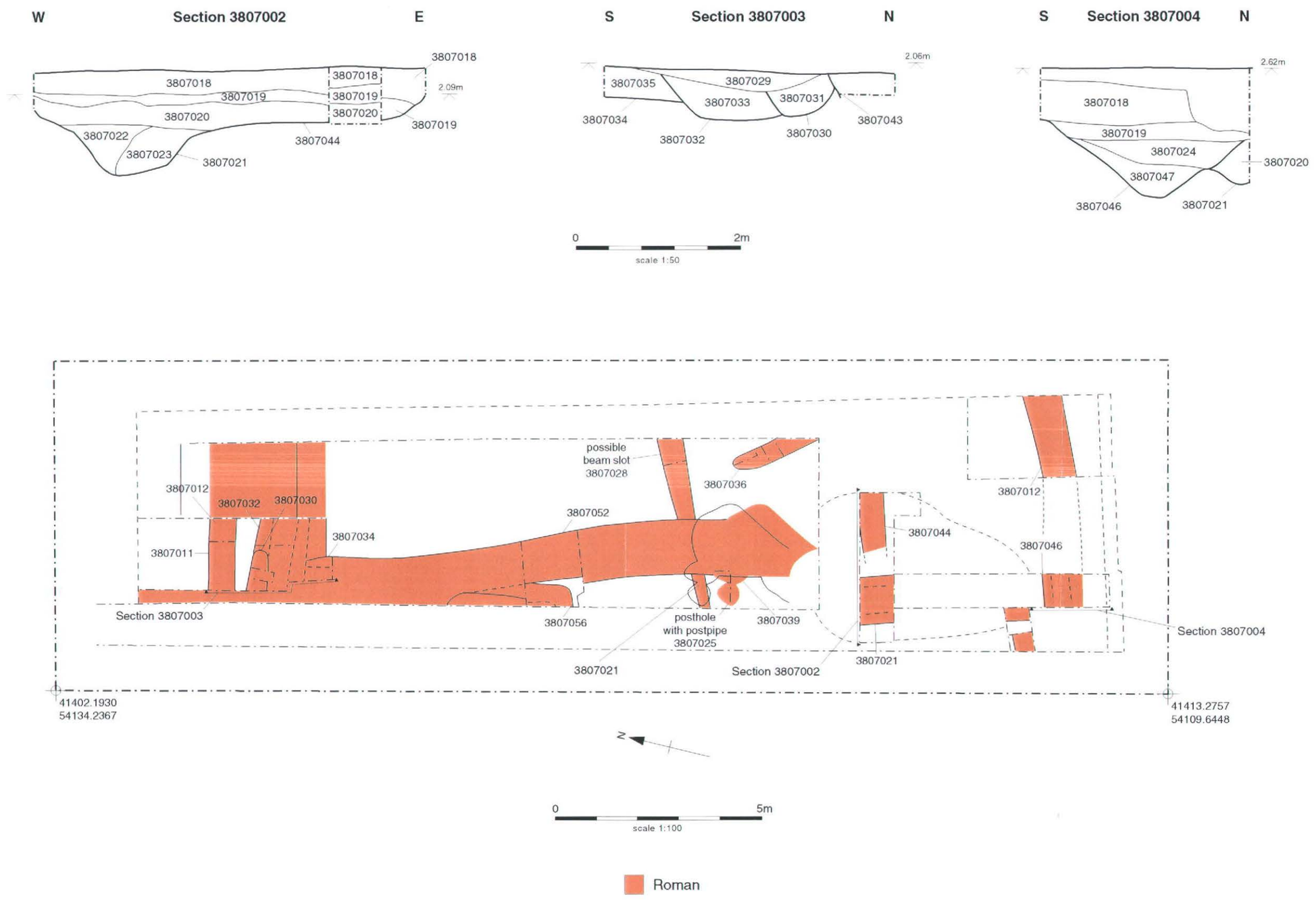


Figure 5: Zone 2, Trench 3807TT plan and sections

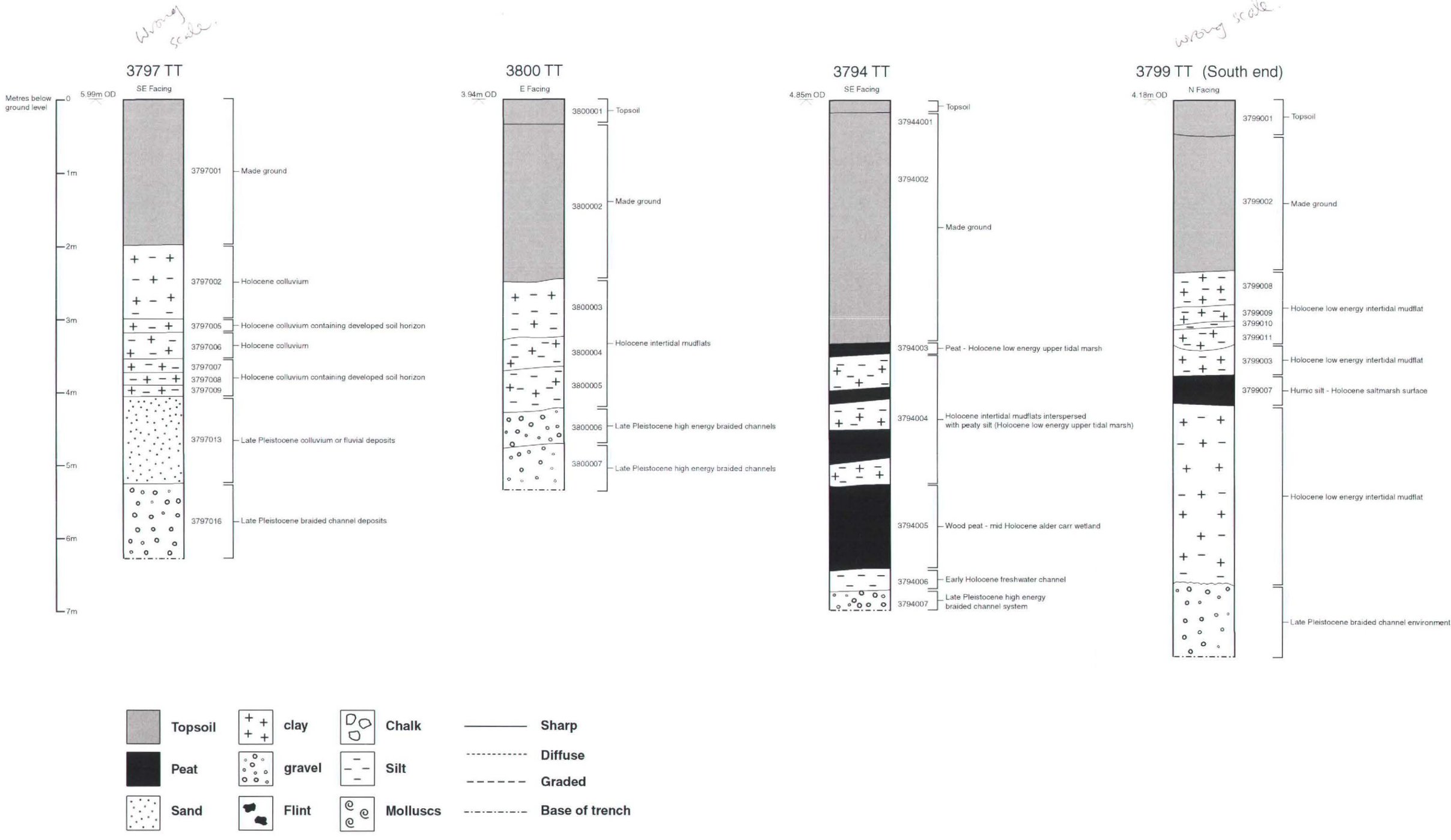


Figure 6: Zone 3, Trench logs 3797TT, 3799TT, 3800TT, 3794TT

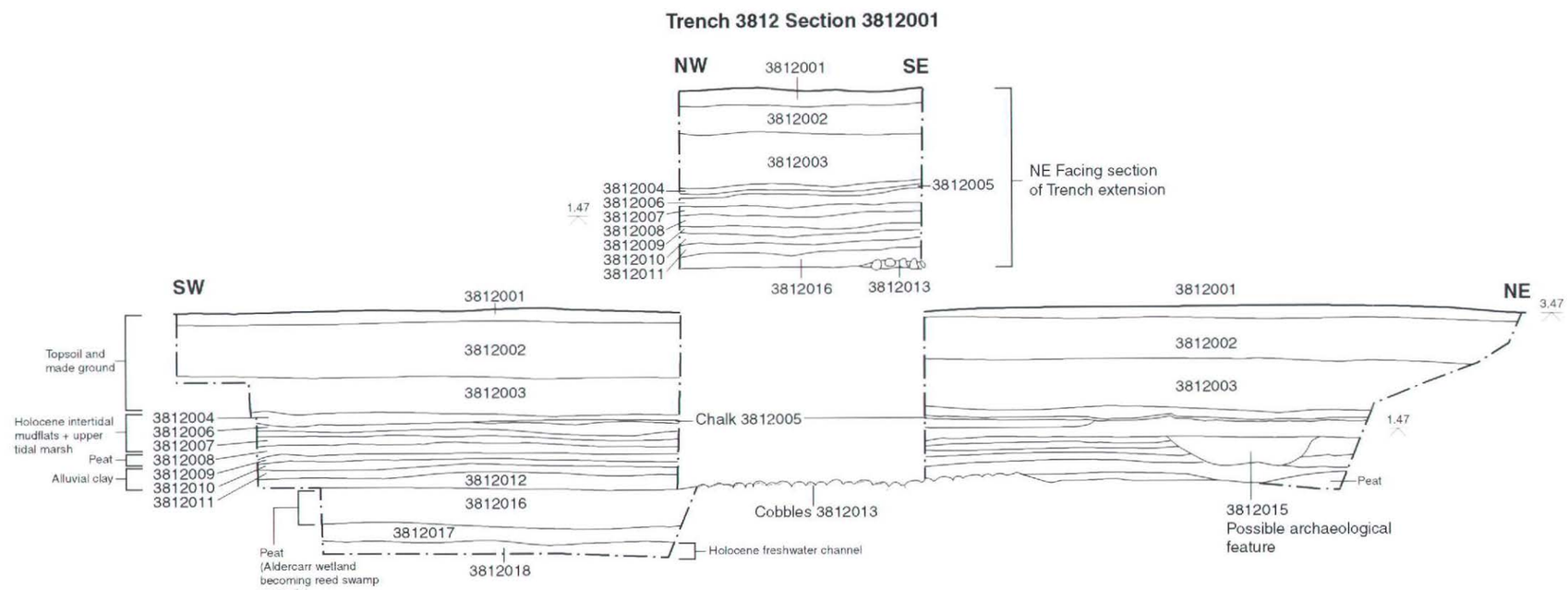
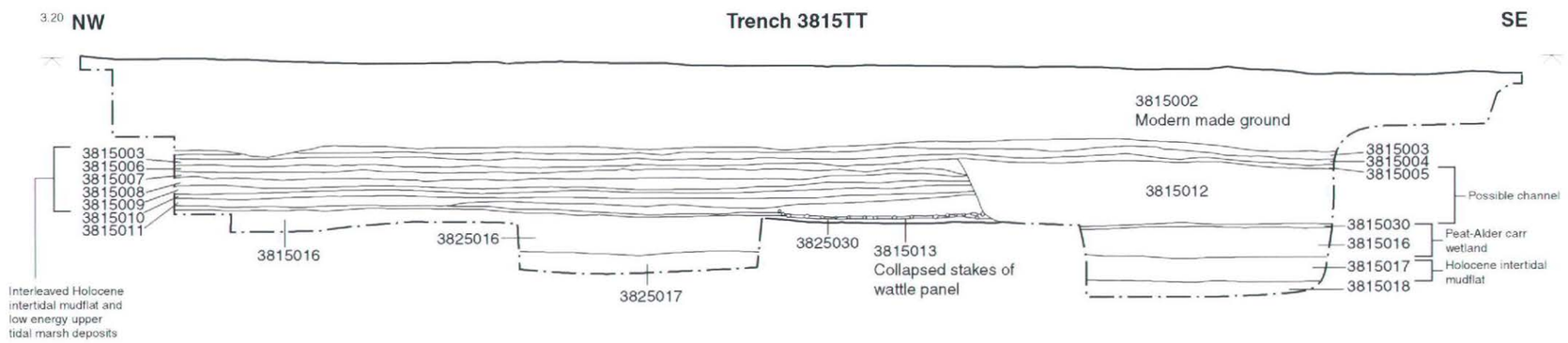


Figure 7: Zone 3, Trench 3812 plan and section



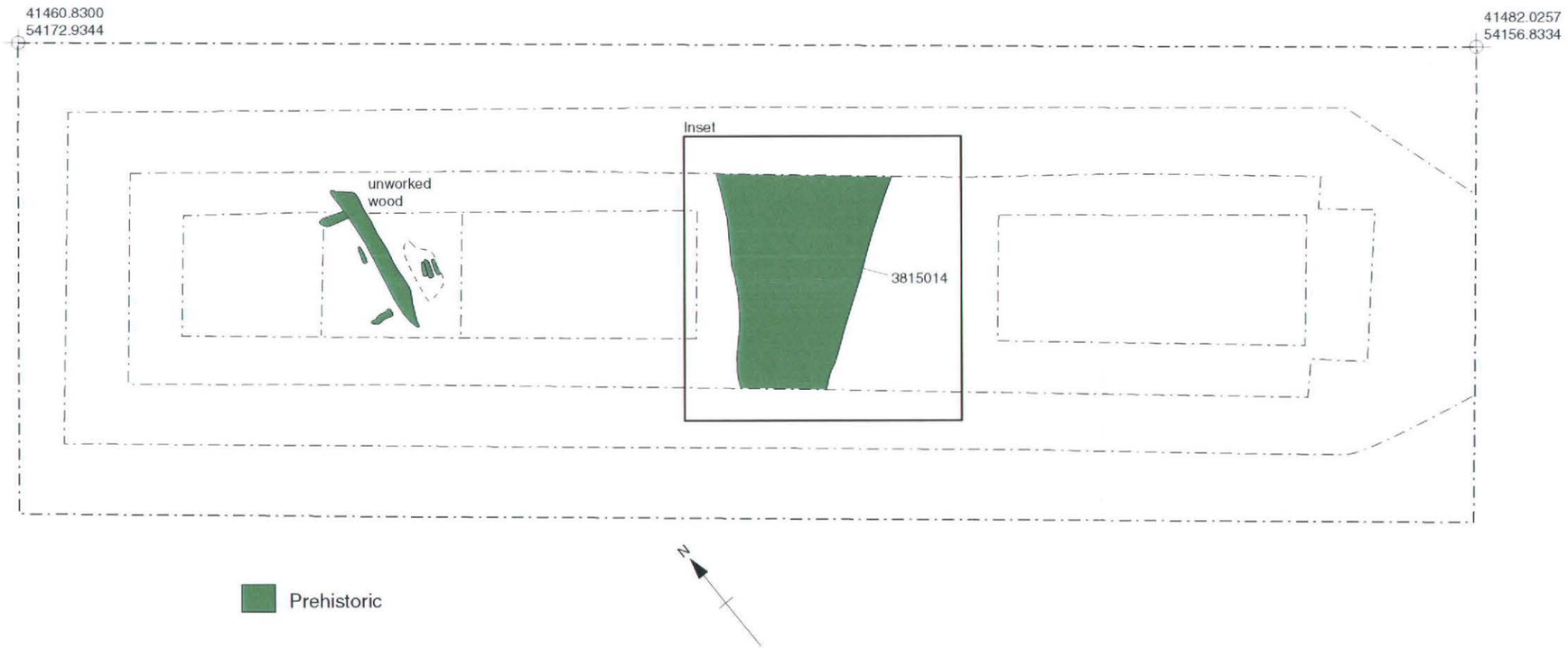


Figure 8: Zone 3, Trench 3815TT plan and section.

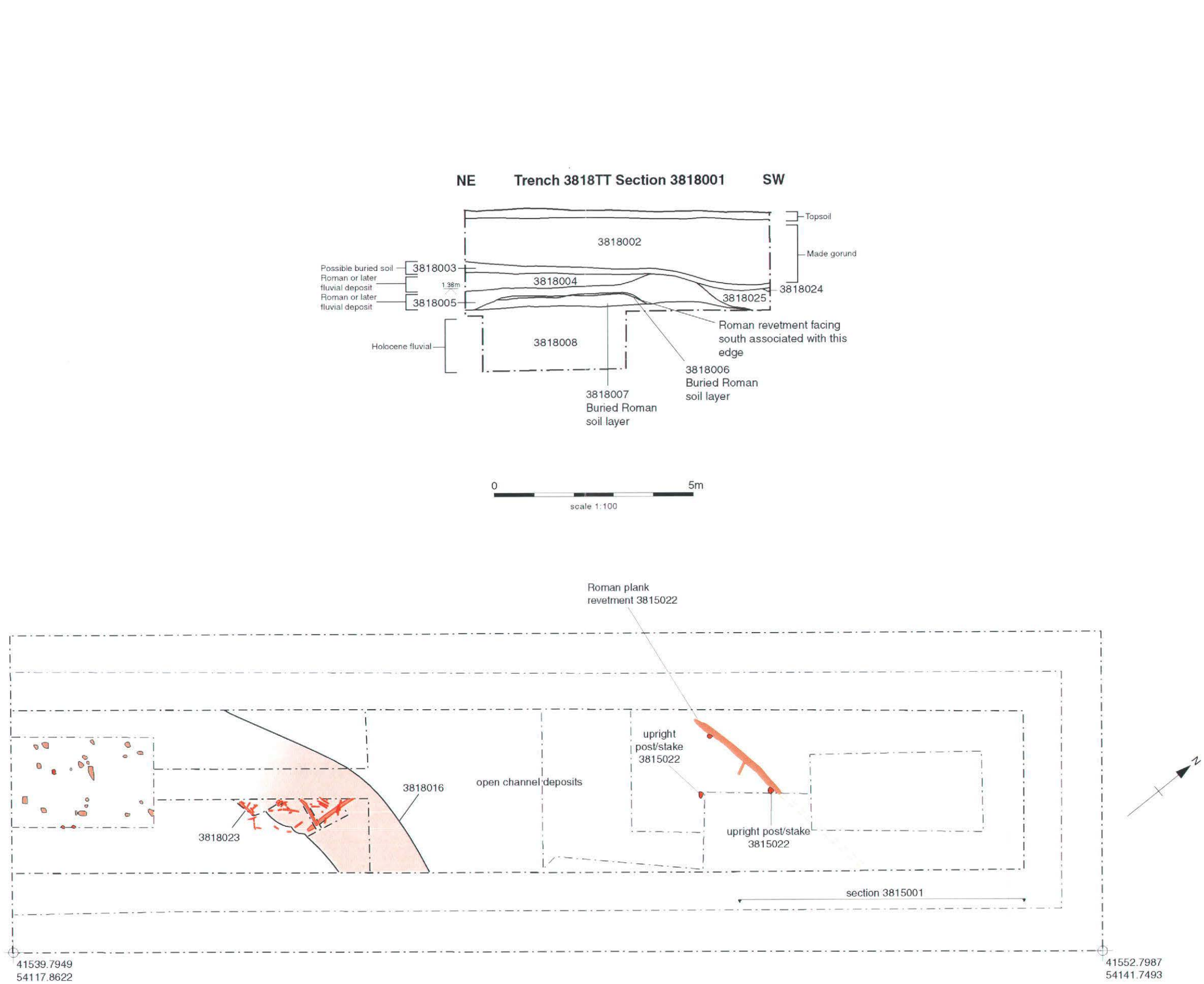


Figure 9: Zone 3, Trench 3818TT plan and section.

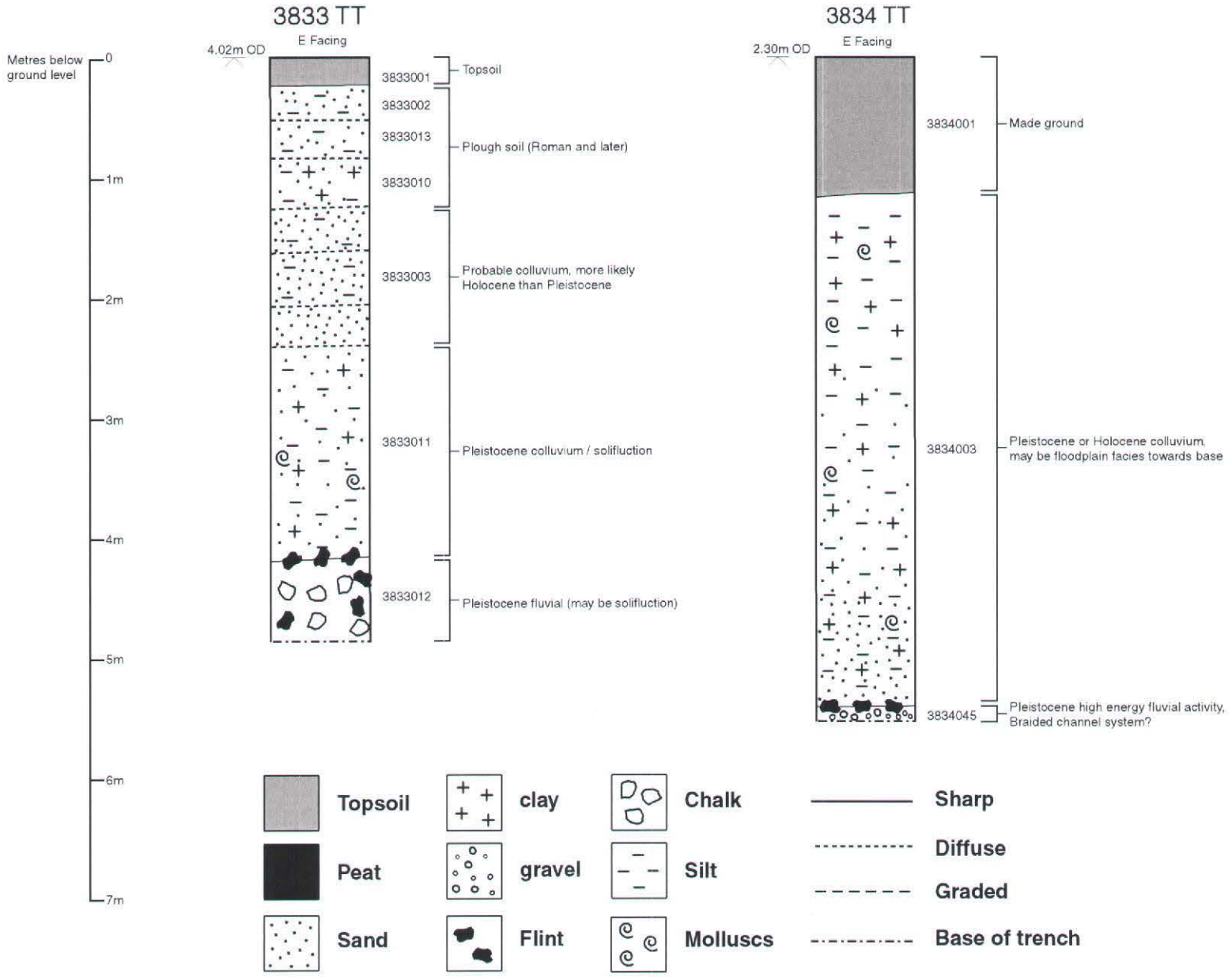
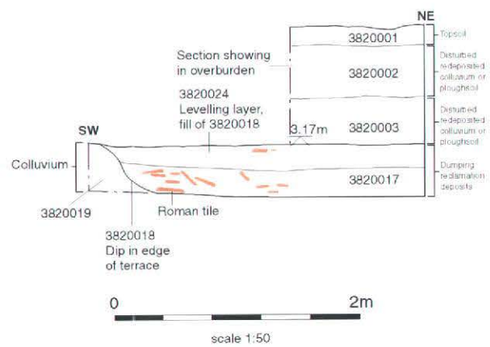


Figure 10: Zone 4, Trench logs 3833TT, 3834TT,

Trench 3820 Section



Trench 3820 Plan

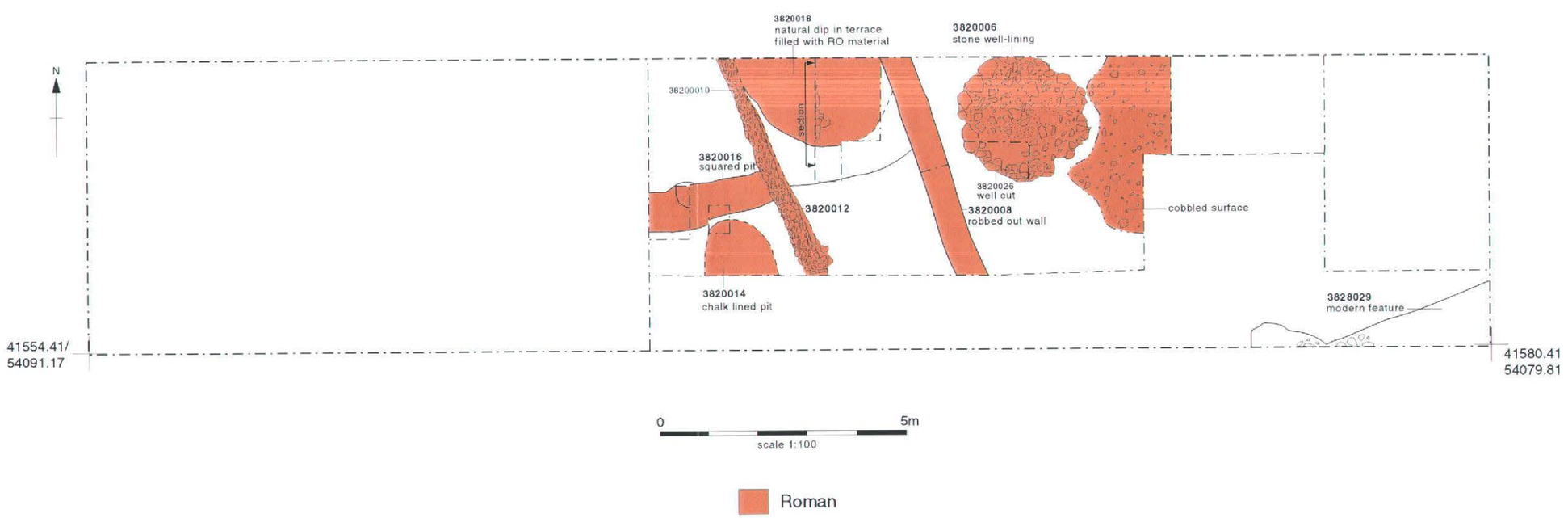
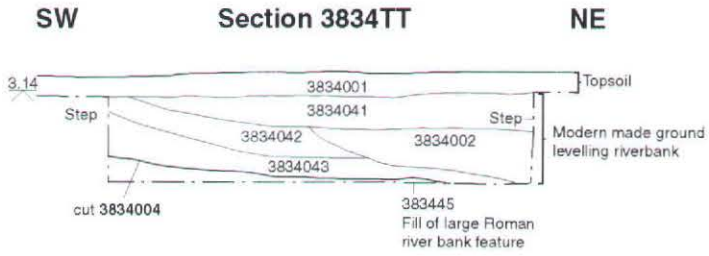


Figure 11: Zone 4, Trench 3820TT plan and section.

Figure 12: Zone 4, trench 3831TT plan and section



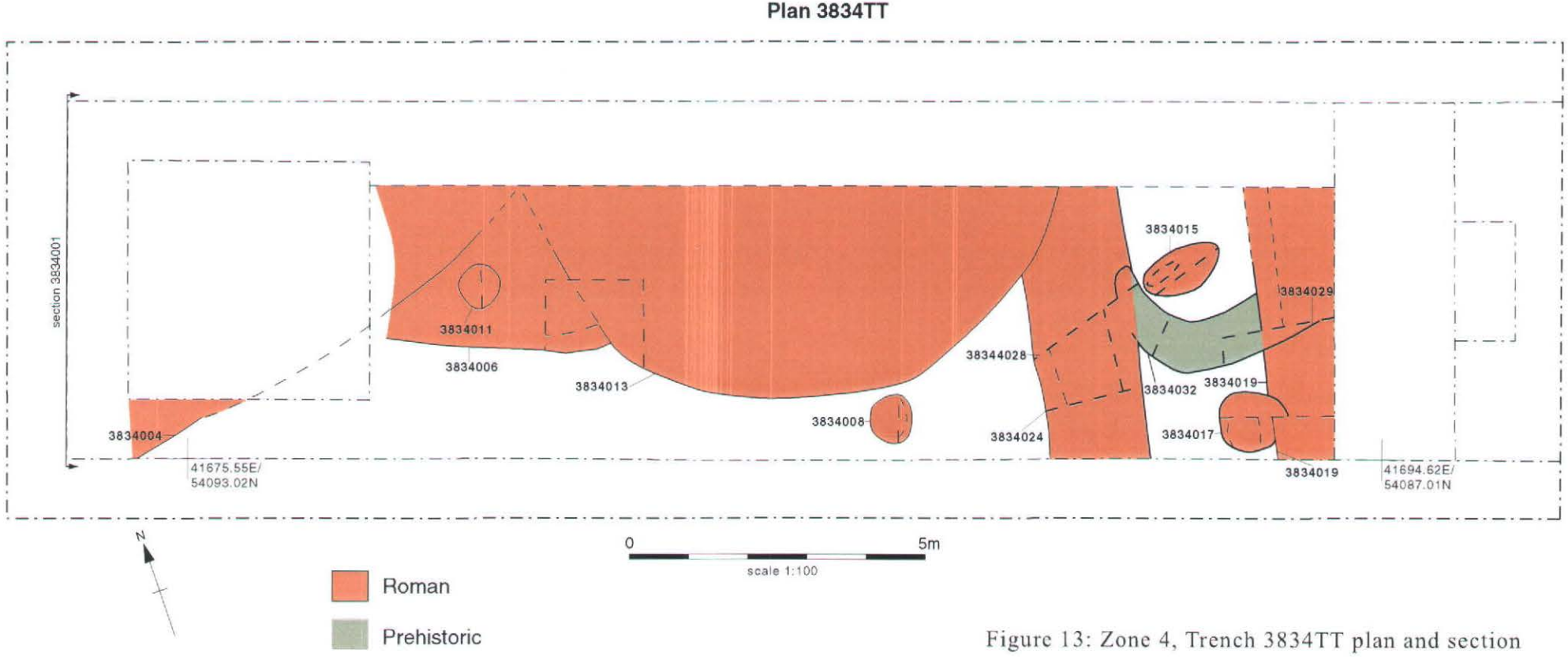


Figure 13: Zone 4, Trench 3834TT plan and section

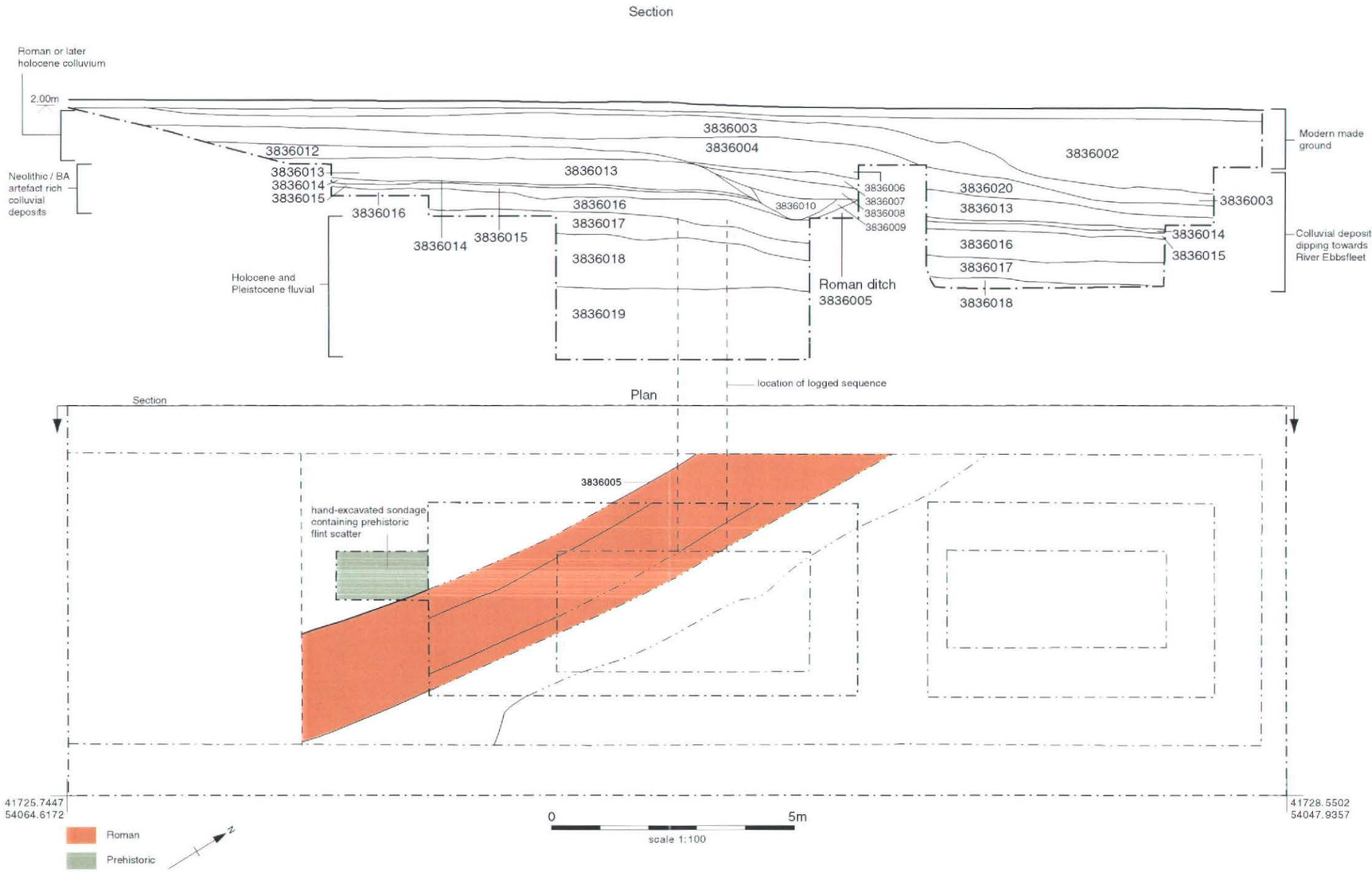


Figure 14: Zone 4, Trench 3836TT plan and section

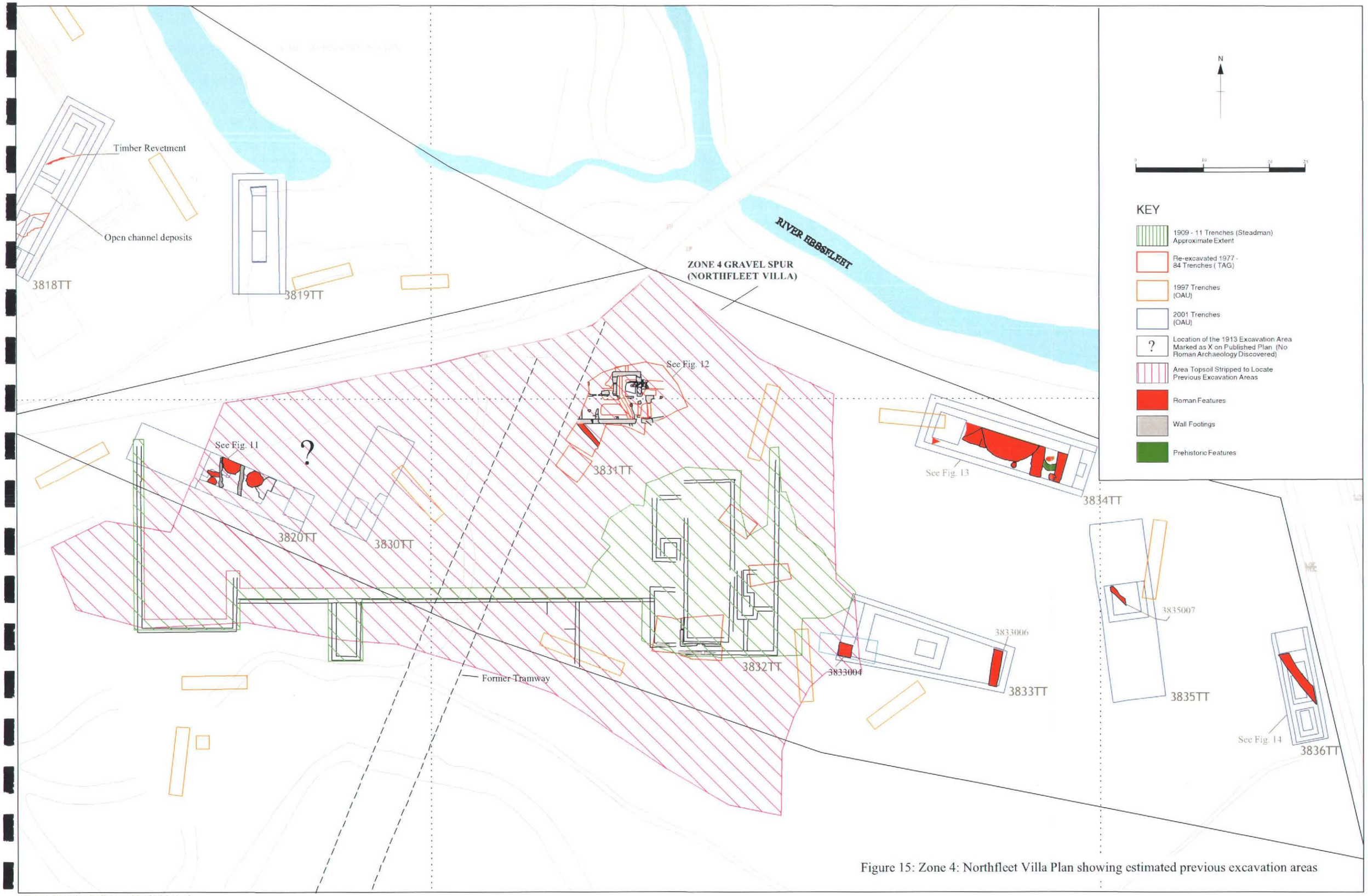


Figure 15: Zone 4: Northfleet Villa Plan showing estimated previous excavation areas

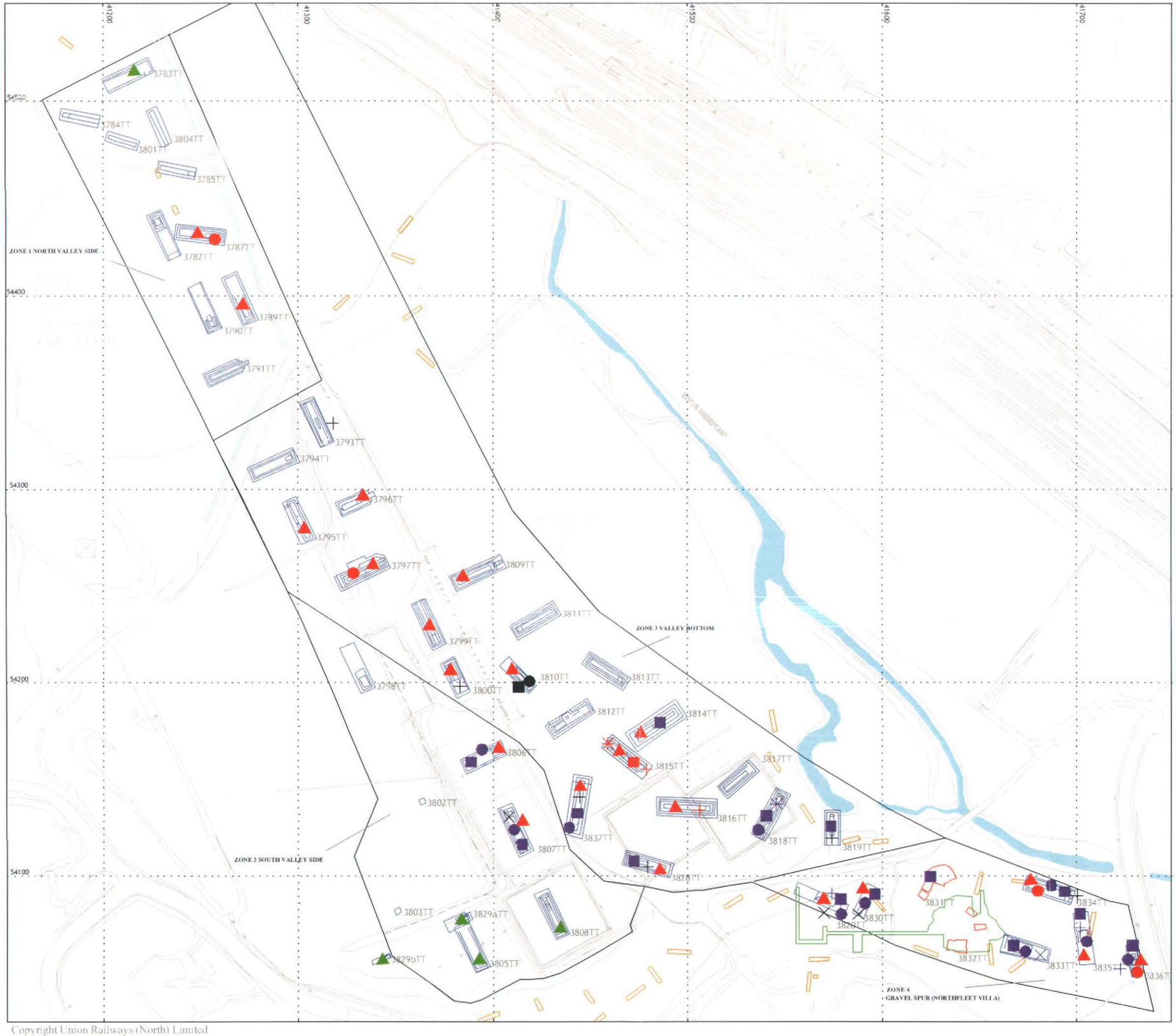


Figure 16: Distribution of Finds

Figure 17: Principal Areas of Palaeolithic/Pleistocene Potential

Figure 18: Principal Areas of Later Prehistoric Activity

Figure 19: Principal Areas of Iron Age/Roman Activity

Key for figures 20-24

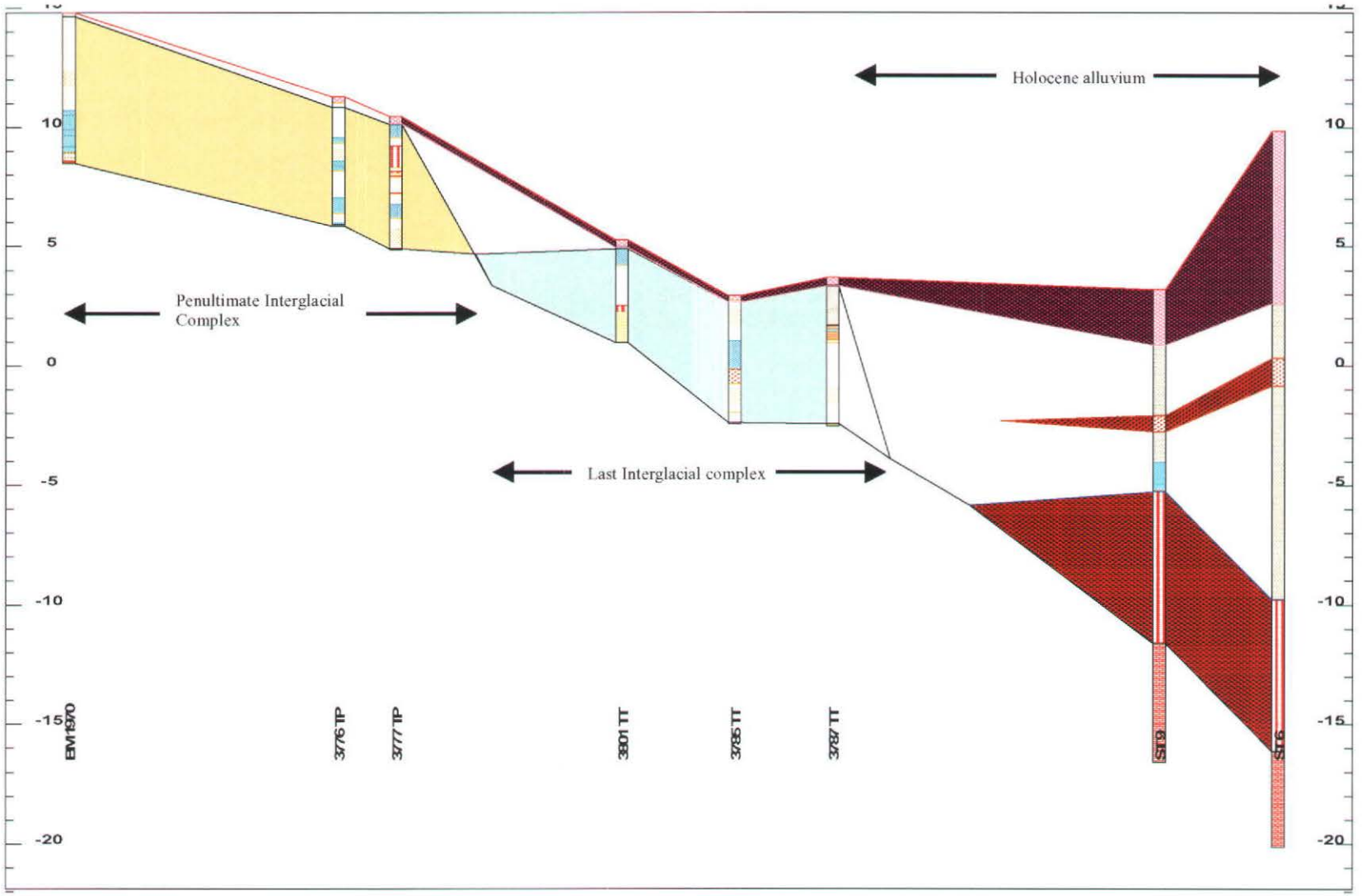


Figure 20: Cross-section 1, Zone 1 North Valley Side sediment complexes showing the Penultimate Interglacial complex (comparable with the ZR4 sequences), the Last Interglacial complex (comparable with 0021SA sequences) and the Holocene sediments. For location, see figure 2.

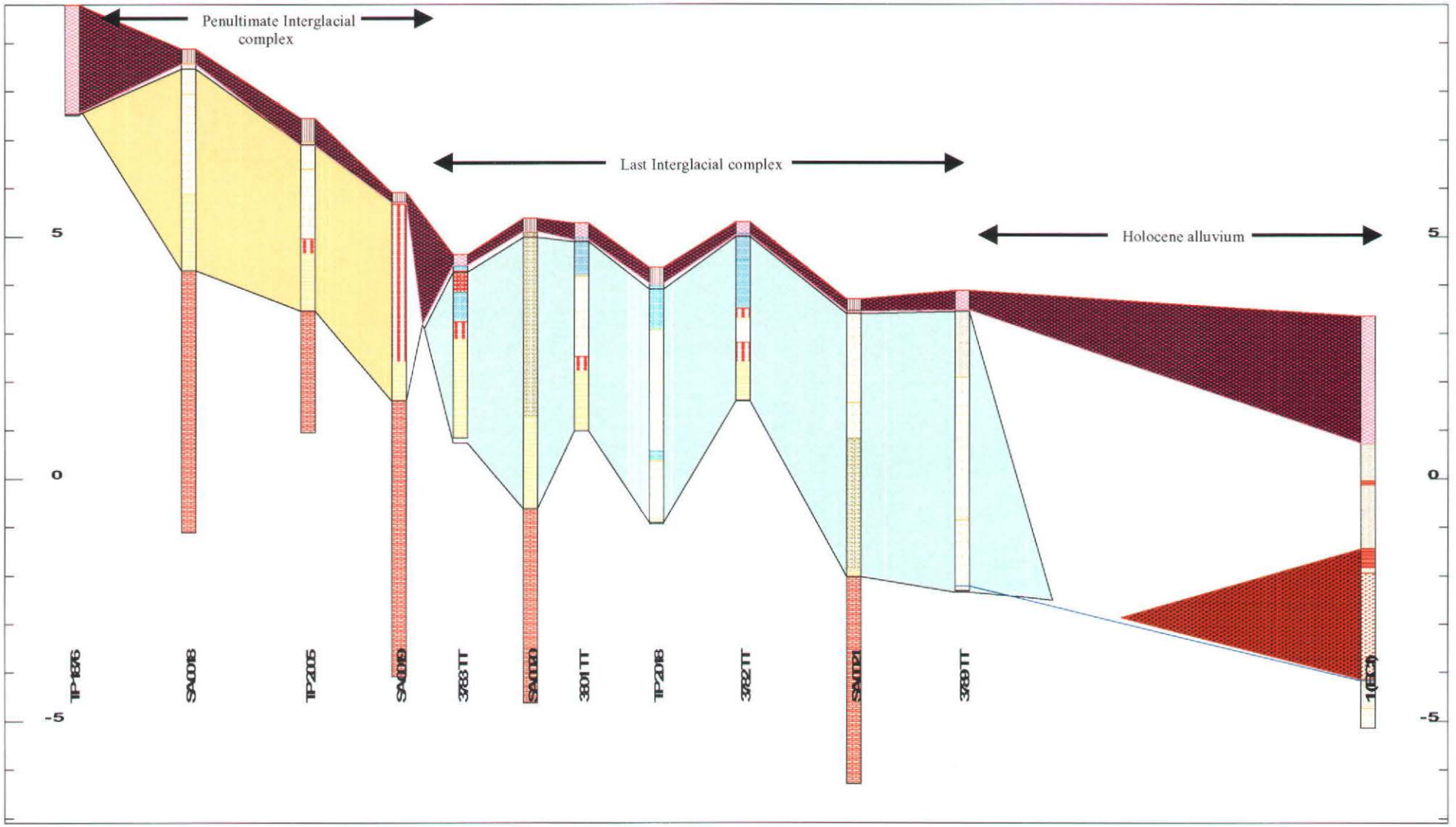


Figure 21: Cross-section 2, complex of Pleistocene sediments at north end of route corridor showing a broad sub-division of deposits into Penultimate Interglacial complex (comparable with the ZR 4 sequences) and Last Interglacial complex (comparable with the 0021 SA borehole sequence). For location, see figure 2.

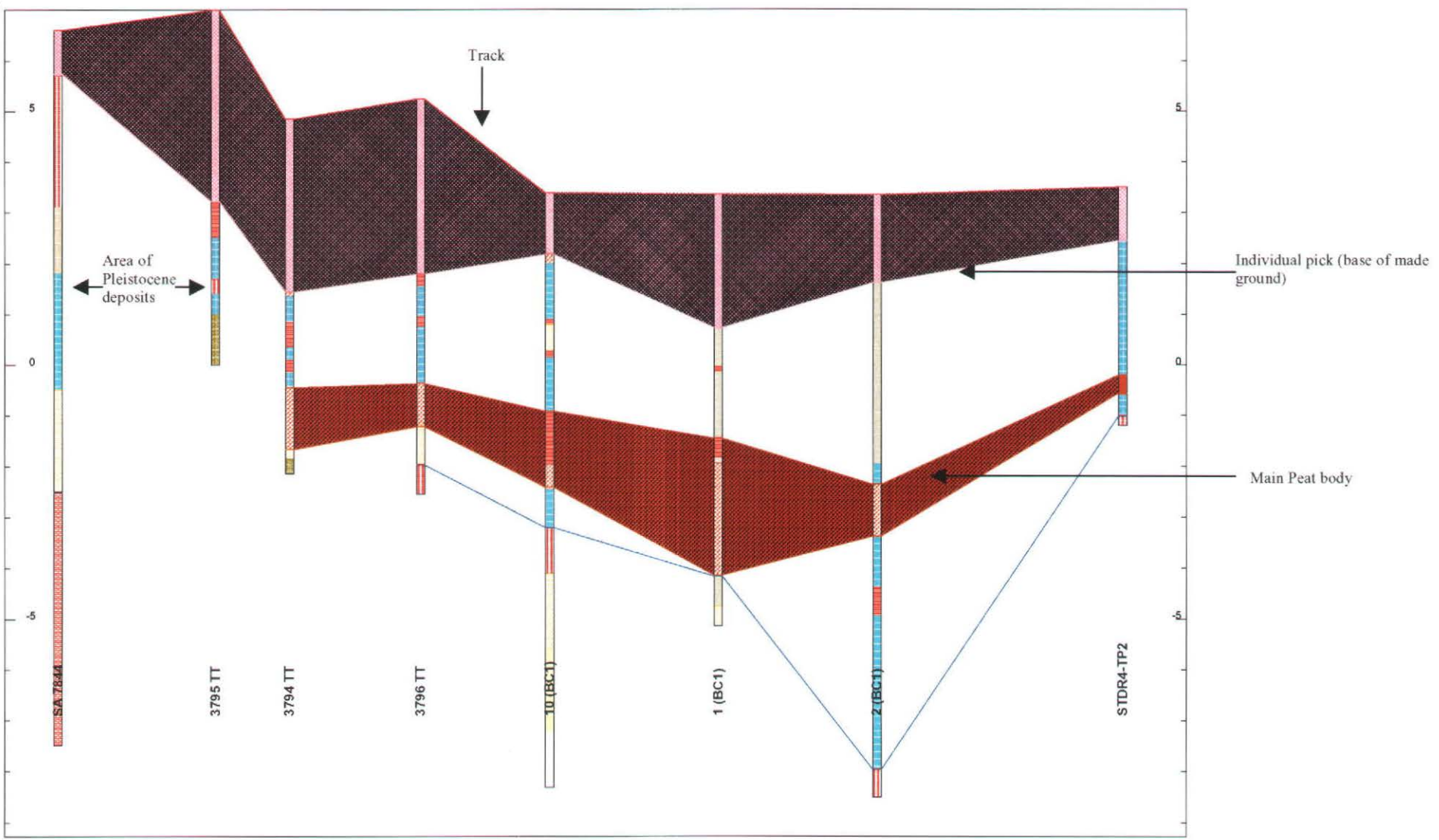


Figure 22: Cross-section 3, TerraStation cross section showing correlated (picked) surfaces of top of Shepperton Gravels, top and base of main peat unit and base of made ground. For location, see figure 2.

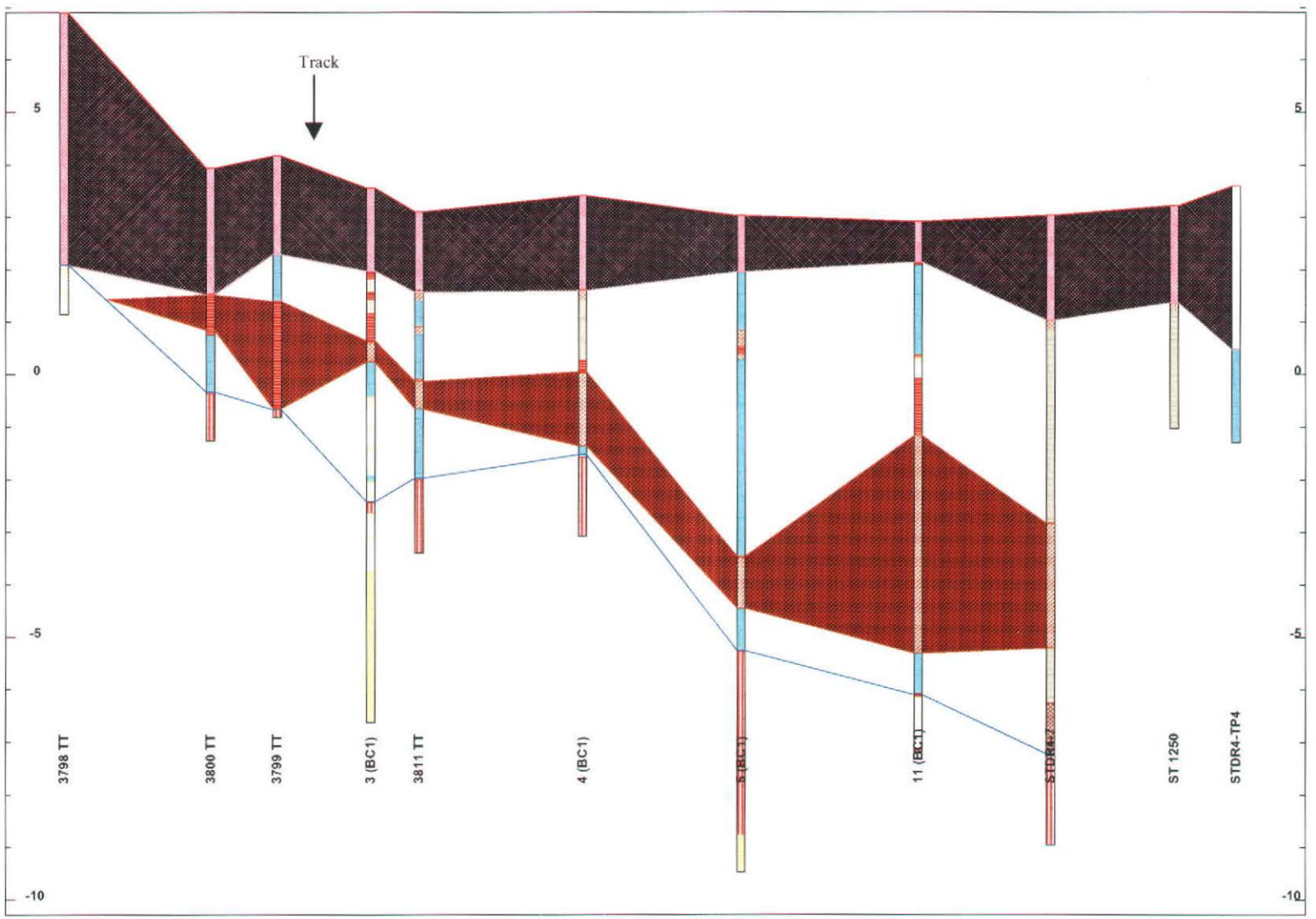


Figure 23: Cross-section 4, west-east transect showing Holocene sediments thinning out against rising gravel surface at edge of alluvium. For location, see figure 2.

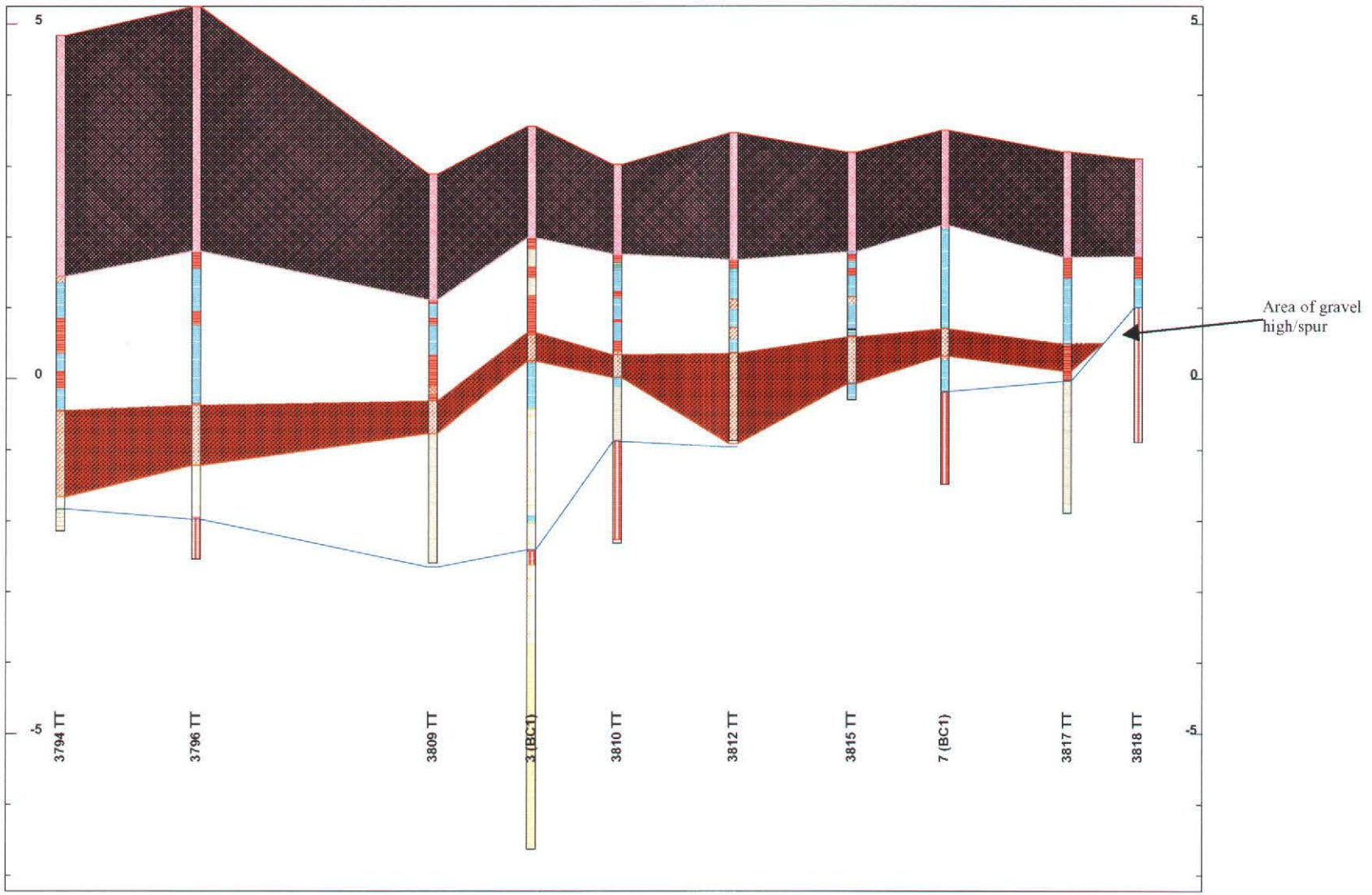
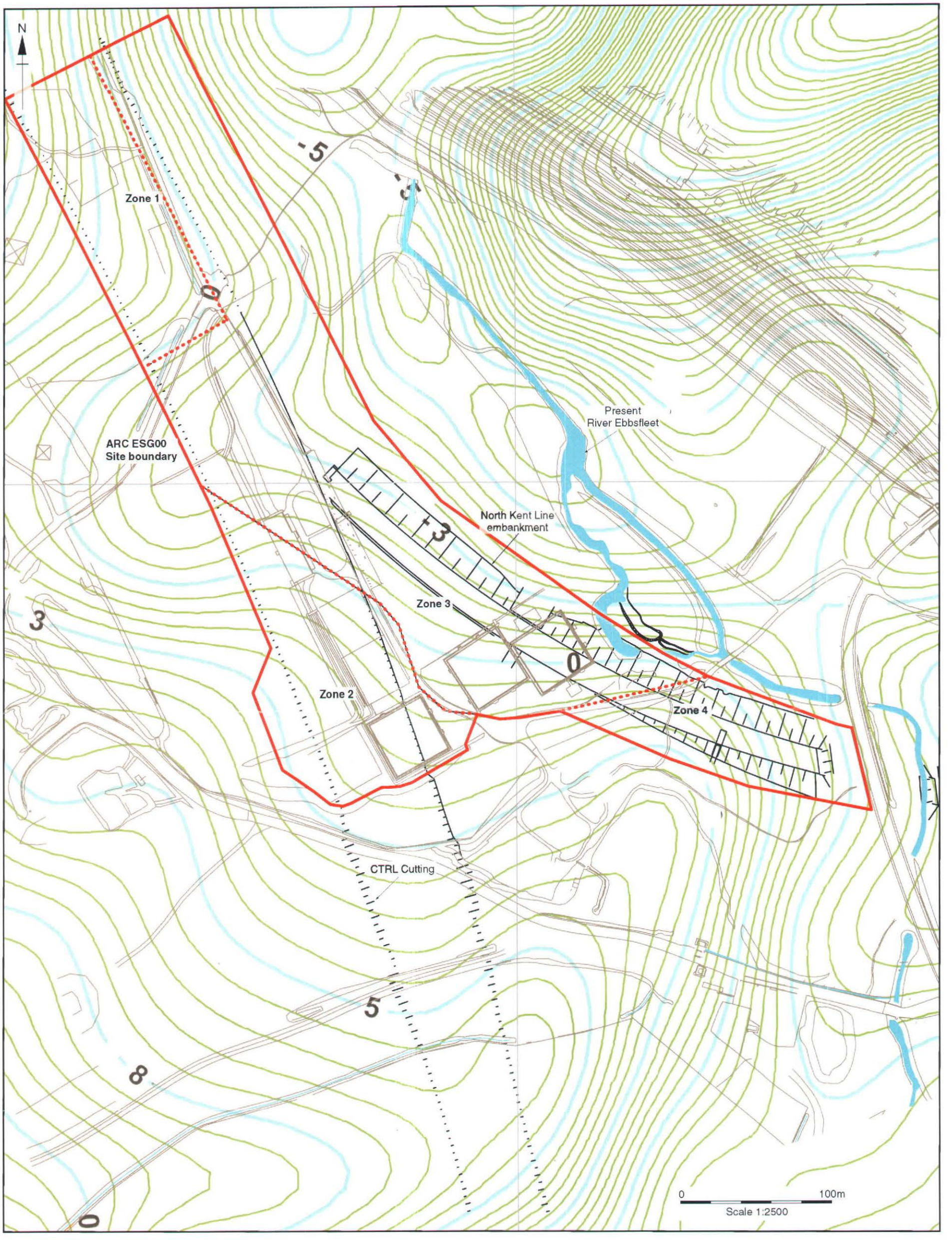
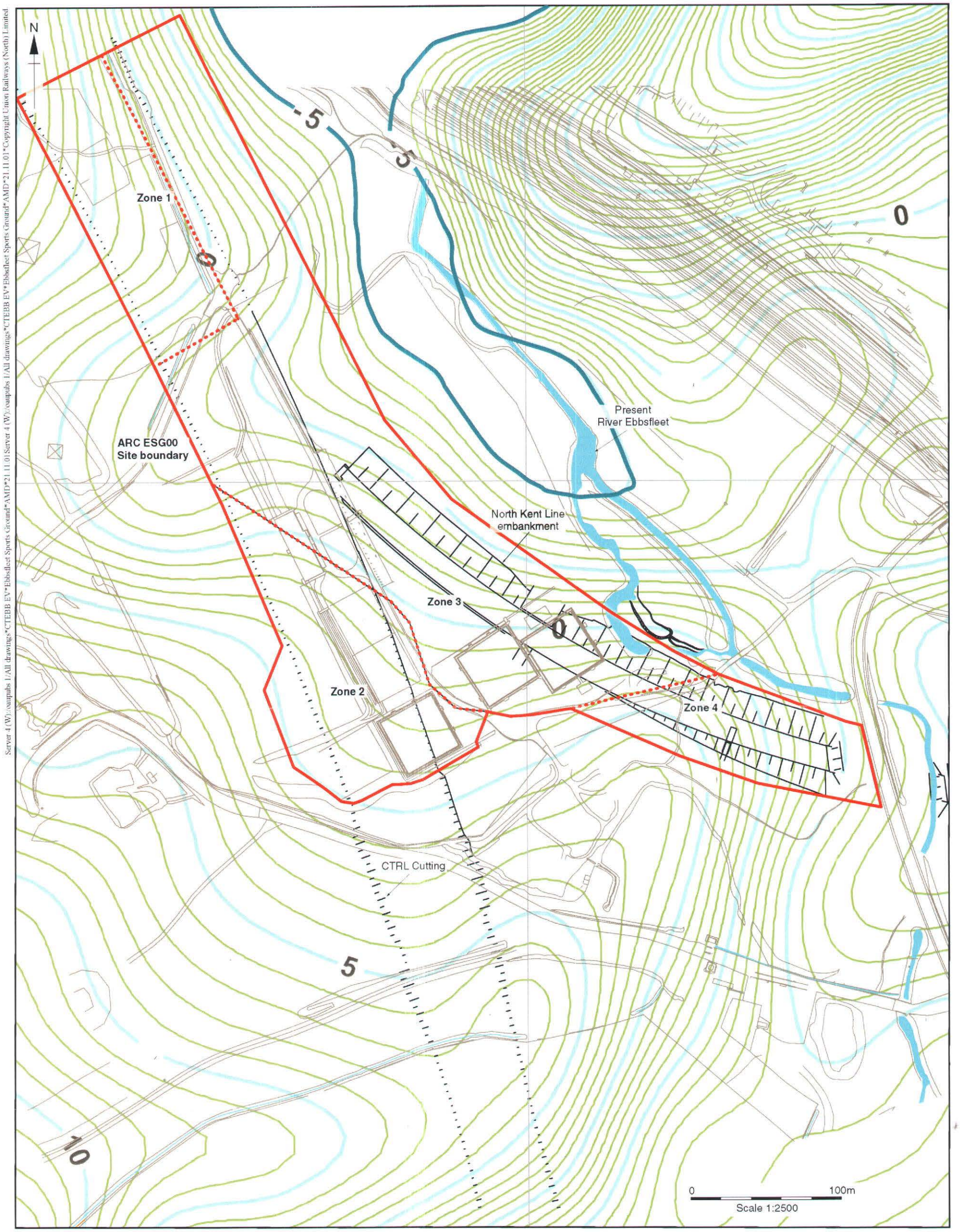


Figure 24. Cross-section 5, north –south profile showing Holocene deposits in the vicinity of the former sports pavilion. Holocene sediments, including the peat body wedge out against the rising gravel surface to the south. Holocene cut and fill channel structures and a Roman revetment in 3818 TT are noted to lie at datums above peat formation levels in adjacent trenches. For location, see figure 2.



Contouring at 0.5m intervals

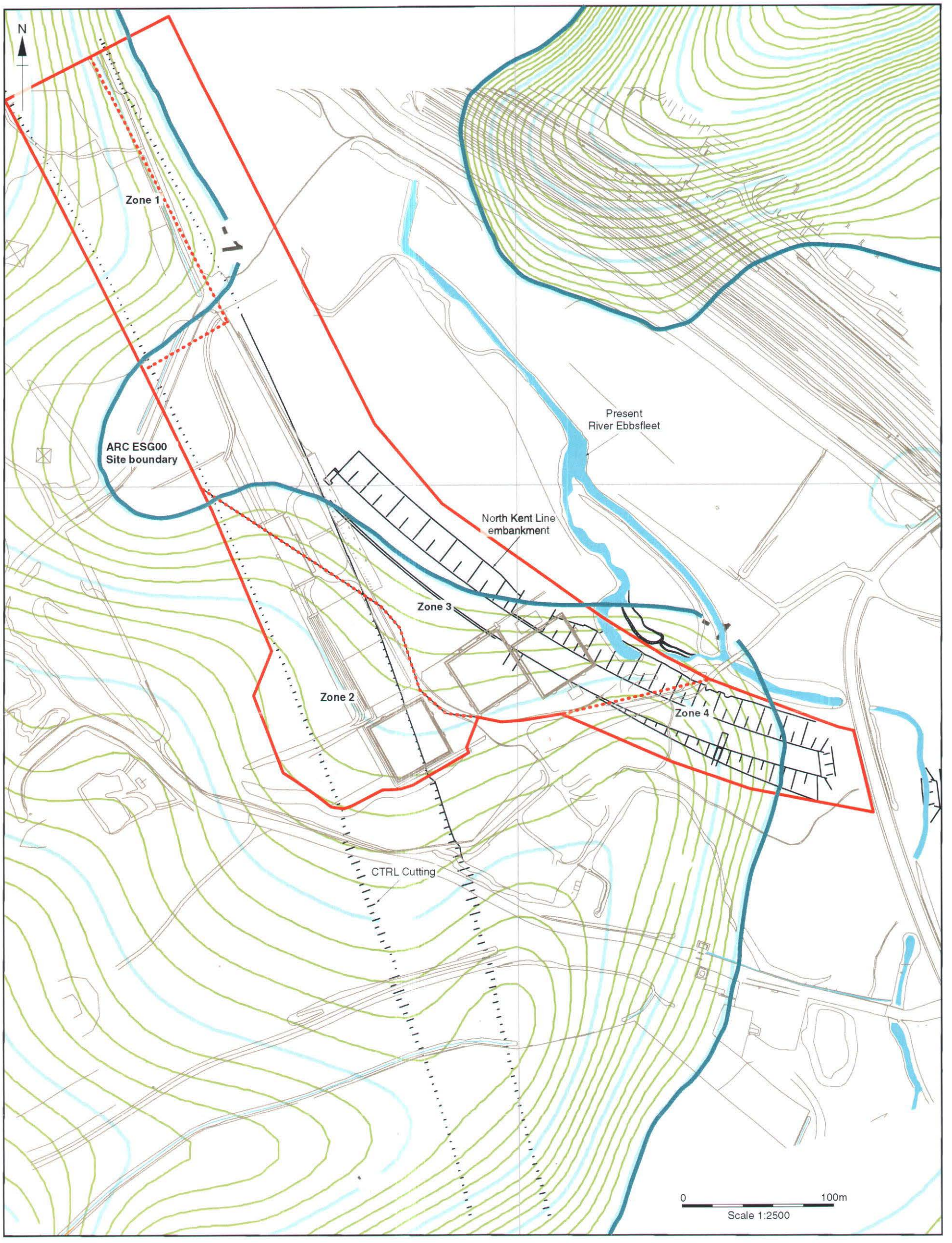
Figure 25: Detailed topographic projection of the Shepperton Gravel surface for evaluation area



Contouring at 0.5m intervals

Reconstruction of Early Neolithic wetland boundary (-5m OD contours of the Shepperton Gravel surface).

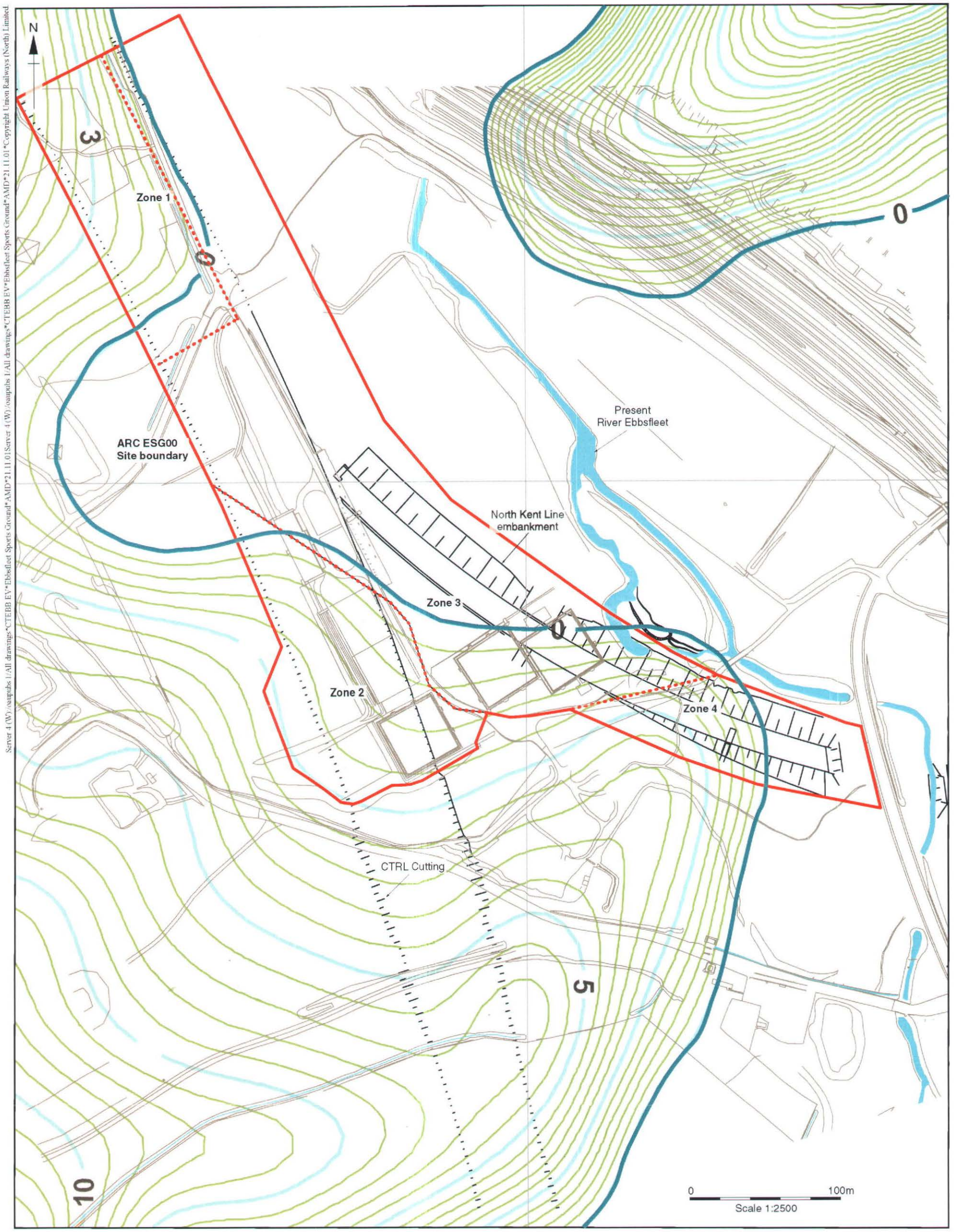
Figure 26: Topographic reconstruction for early Neolithic landscape in lower Ebbsfleet Valley showing probable wetland boundary (-5m contour)



Contouring at 0.5m intervals

Reconstruction of Early Bronze Age wetland boundary (-1m OD contours of the Shepperton Gravel surface).

Figure 27: Topographic reconstruction for early Bronze Age landscape in lower Ebbsfleet Valley showing probable wetland boundary (-1m contour)



Contouring at 0.5m intervals

Reconstruction of the Roman wetland boundary
(0m OD contours of the Shepperton Gravel surface).

Figure 28: Topographic reconstruction for Roman landscape in lower Ebbsfleet Valley showing probable wetland boundary (0m contour)

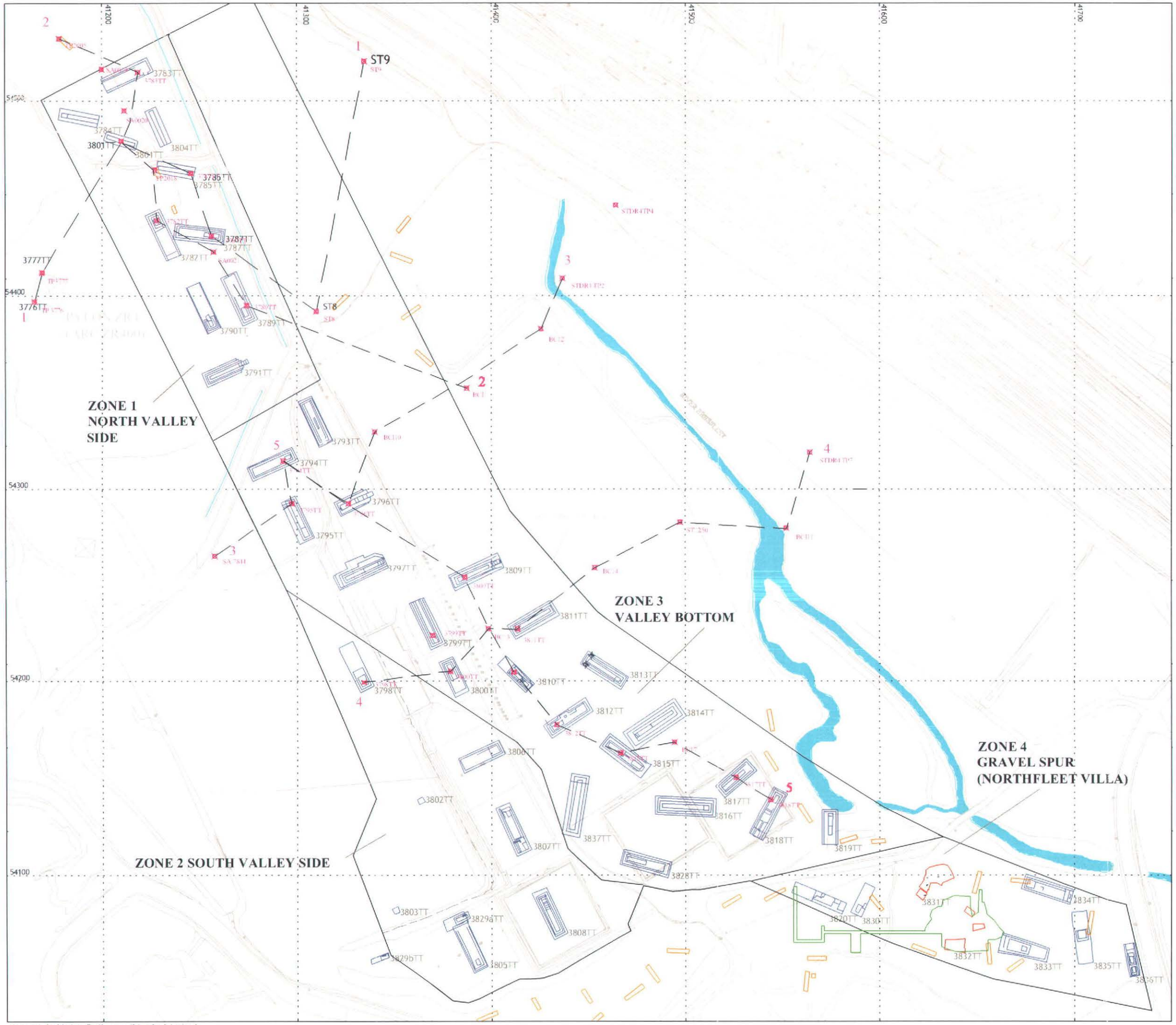


Figure 2: Trench Location Plan (showing locations of geological cross-sections)

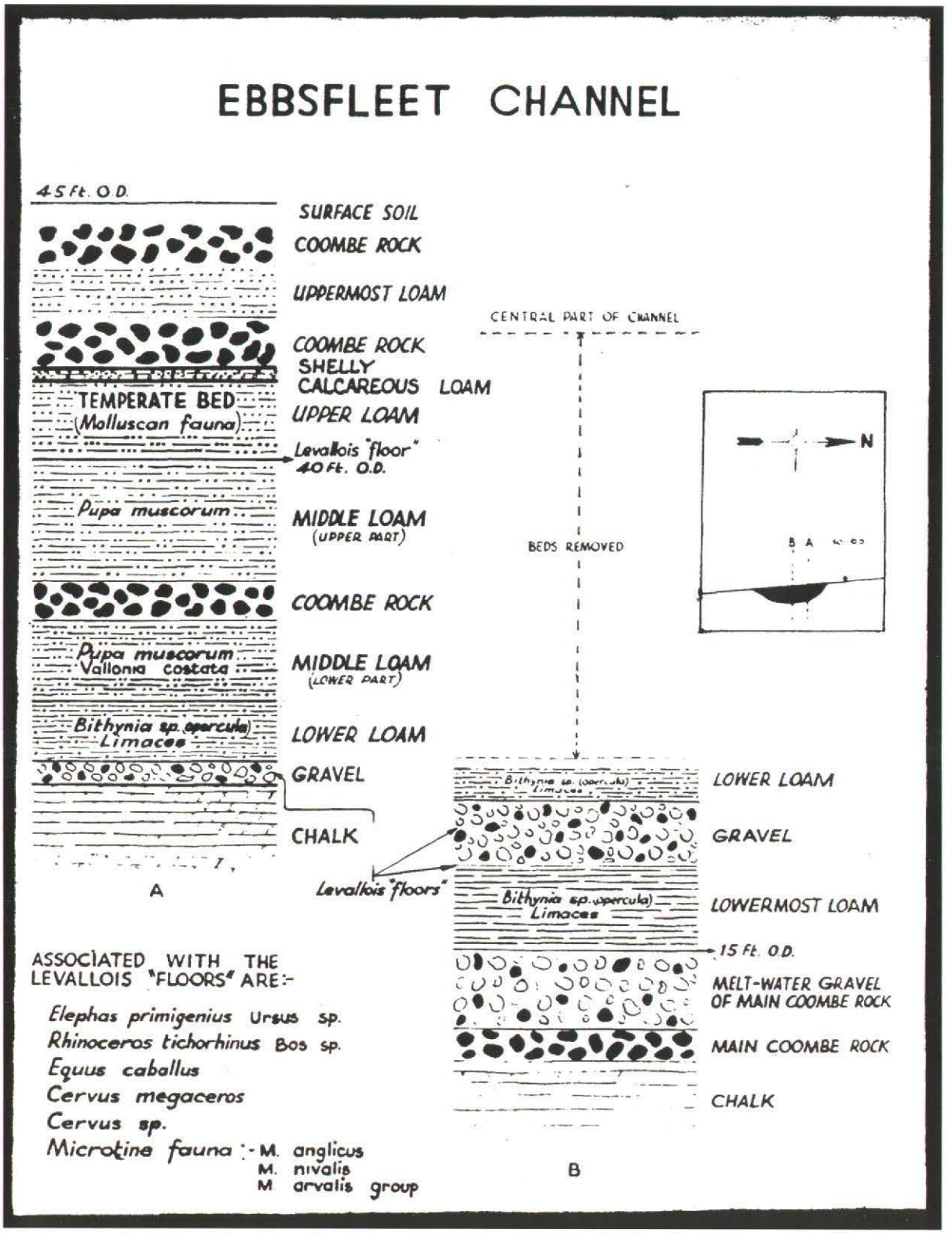


Figure 29: Burchell's summary of his Ebbsfleet Valley channel sites (unpublished - F Wenban-Smith pers.comm)

00 21 SA

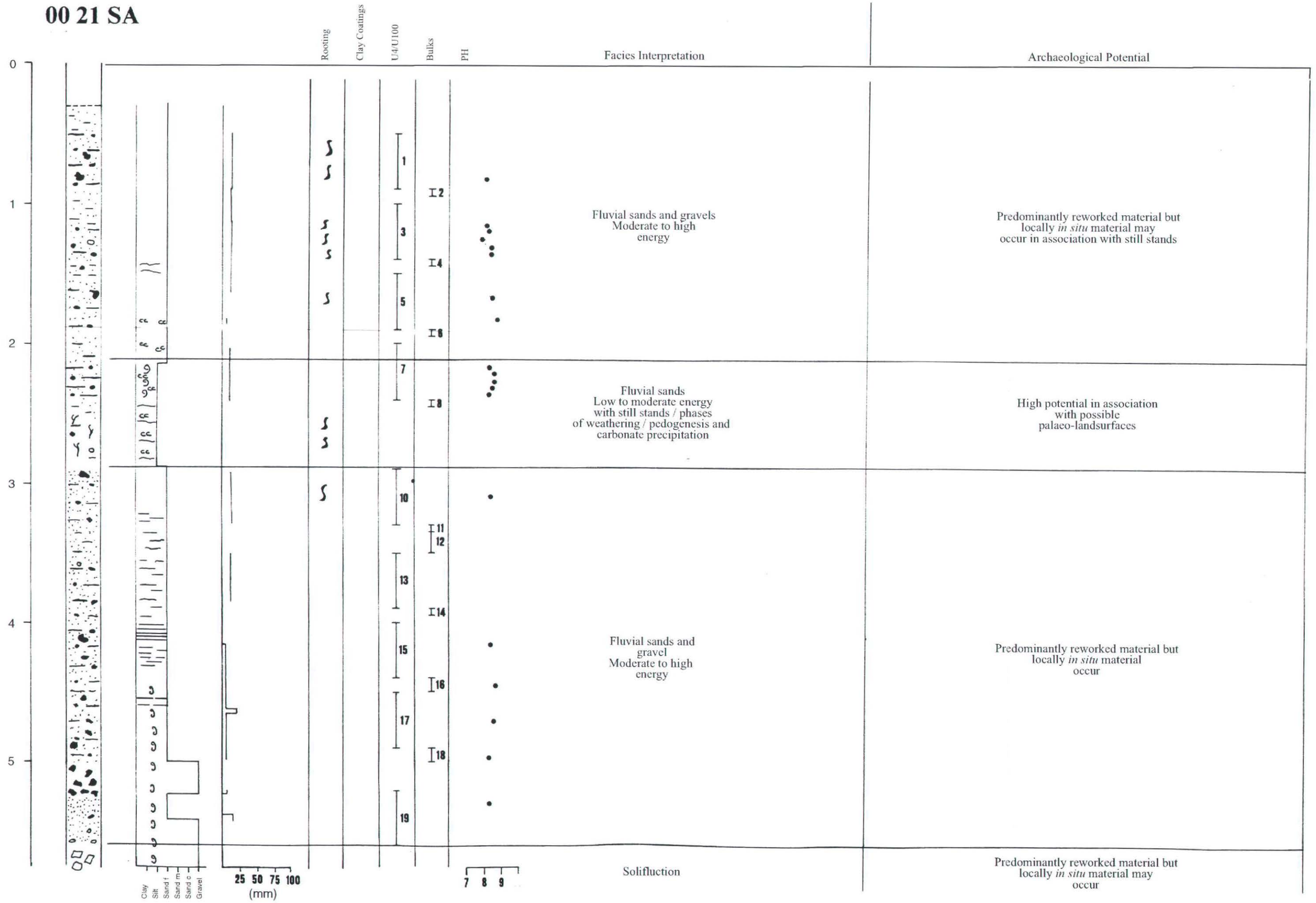


Figure 30: Borehole 0021SA (from Phase1 evaluation (URL 1997)) - included for comparison with Zone 1 logs.

Plate 1: Zone 3, Trench 3815TT, Middle Bronze Age wattle panel under excavation.

Plate 2: Zone 3, Trench 3812TT, Flint cobbled surface.

Plate 3: Zone 4, Northfleet Villa bathhouse re-exposed.

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