Bovis Homes Ltd

Land adjacent to Powdermill Lane and Hawley Road, Dartford, Kent

ARCHAEOLOGICAL EVALUATION REPORT

NGR TQ 542 728

Planning Ref: DA/00/0353

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March 2001

Land adjacent to Powdermill Lane and Hawley Road, Dartford, Kent

ARCHAEOLOGICAL EVALUATION

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SUMMARY

The Oxford Archaeological Unit carried out a field evaluation on land adjacent to Powdermill Lane and Hawley Road, Dartford, Kent, on behalf of Bovis Homes Ltd. The evaluation revealed part of a Roman field system, consisting of a number of ditches and gullies, and a pit. Geological deposits at the site were evaluated to determine their potential to contain evidence of Palaeolithic activity.

1 INTRODUCTION

1.1 Location and scope of work

1.1.1 In February 2001 the Oxford Archaeological Unit (OAU) carried out a field evaluation on land adjacent to Powdermill Lane and Hawley Road, Dartford (Fig. 1) on behalf of Bovis Homes Ltd. The work was carried out in respect of a condition attached to planning permission (Planning Application No. DA/00/0353) granted for residential development of the site.

1.1.2 The work was carried out according to a *Specification* (KCC November 2000) set by Kate Evans of the Heritage Conservation Group, Kent County Council.

1.1.3 The development site is situated in a built up area 1 km south of Dartford town centre and immediately to the west of the River Darwent and is *c* 1.2 ha in area.

1.2 Geology and topography

1.2.1 The underlying geology of the site, according to the British Geological Survey (BGS), is alluvium to the east and undifferentiated Floodplain gravel on the western part of site. The site is situated on wasteground which was previously woodland.

1.3 Archaeological and historical background

1.3.1 The archaeological background to the evaluation has been taken from the *Specification*. There are several known sites and locations with archaeological remains adjacent to the development site.

1.3.2 The site lies only *c.* 100 m from the mapped boundary of the Boyn Hill Gravels where numerous Palaeolithic flint artefacts have been found previously (Wessex Archaeology, Southern Rivers Palaeolithic Project. NWK nos 1-4). Recent investigations elsewhere in north-west Kent have shown that Boyne Hill Gravels can extend at least 300 m beyond the limits mapped by the BGS. The sediment logged as Undifferentiated or Floodplain gravels may also contain Palaeolithic artefacts and may extend beyond the limits mapped by the BGS. Also of significance is the general location of the development site at the valley-side edge of a Pleistocene terrace sequence. Such locations are well known for the preservation of undisturbed Palaeolithic remains due to a burial by thick slope deposits and the survival of feather-edge river deposits.

1.3.3 Significant later prehistoric and Roman remains have been found within peat and silt deposits about 150 m to the north-west of the Powdermill Lane site. In addition, a series of Roman buildings have been recorded to the south of Dartford town centre along the higher ground on the western side of the development site. Other Roman settlement evidence, possibly a small Roman villa, is known to lie about 150 m to the west.

1.3.4 Site investigations have been carried out in the form of test pits and boreholes (ENSR International – Report for Bovis Homes, July 2000) to establish the extent of previous gravel extraction and landfill. The current evaluation area (Site A) has not been extracted in the past but has a layer of made ground at depths from *c.* 0.5 m to *c.* 1 m below existing ground level.

1.4 Acknowledgements

1.4.1 Thanks are extended to Frank Clifford of Bovis Homes whose assistance with the evaluation is greatly appreciated.

2 EVALUATION AIMS

2.1 General

2.1.1 To determine and understand the location, nature, date, function, character and state of preservation of any archaeological features or deposits that may be present in order to allow the effective targeting of further investigation of the site prior to or during the early stages of the development.

2.1.2 To preserve by record any archaeological remains that are excavated during the course of the evaluation.

2.1.3 To make available the results of the investigation.

2.2 Site Specific

2.2.1 See Appendix 2, Section 3.

3 EVALUATION METHODOLOGY

3.1 Scope of fieldwork

3.1.1 The evaluation (Site A) consisted of eleven trenches (Fig. 2), eight measuring 20 m by 1.8 m (Trenches 1, 2, 3, 4, 6, 7, 9 and 11) two measuring 10 m by 1.8 m (Trenches 8 and 10) and one measuring 30 m by 1.8 m (Trench 5). These were excavated by a JCB fitted with a toothless bucket, under archaeological supervision. At the end of each trench a deeper excavation, measuring 1.8 m by 2.5 m, was dug to the top of the pre-Quaternary deposits or to a depth of 2.5 m.

3.1.2 The deeper excavations were opened to evaluate the potential Palaeolithic deposits,

under the supervision of a Palaeolithic specialist. A report on the results of that evaluation, by Dr Francis Wenban-Smith can be found at the end of this report (see Appendix 2).

3.1.3 Three further trenches were proposed for Site B, north of Powdermill Lane (all 20 m x 1.8 m), although discussions with Kate Evans resulted in the requirement for work there no longer being necessary at this stage, due to limited impact (piled foundations) and considerable Health and Safety concerns.

3.2 Fieldwork methods and recording

3.2.1 The trenches were cleaned by hand and the revealed features were sampled to determine their extent and nature, and to retrieve finds and environmental samples. All archaeological features were planned and where excavated their sections drawn at scales of 1:20. All features were photographed using colour slide and black and white print film. Recording followed procedures laid down in the *OAU Fieldwork Manual* (ed D Wilkinson, 1992). All trenches were tied into the OS Grid.

3.3 Finds

3.3.1 Finds were recovered by hand during the course of the excavation and generally bagged by context. Finds of special interest were given a unique small find number.

3.4 Palaeo-environmental evidence

3.4.1 A selection of potentially Palaeolithic deposits were sampled for the recovery of small bones and artefacts. Due to the lack of waterlogged deposits and charred remains within the later archaeological features encountered, no further environmental samples were taken.

3.5 Presentation of results

3.5.1 Section 4.3 includes individual context descriptions, with archaeological deposits and features described from earliest to latest. Additional context information can be found in the context inventory (Appendix 1).

4 RESULTS: GENERAL

4.1 Soils and ground conditions

4.1.1 The site consisted of sandy clays and gravel alluvium overlain by sandy clay deposits; no difficult ground conditions were encountered. The only major recent ground disturbance seemed confined to the south east corner of the site (Trench 6).

4.2 Distribution of archaeological deposits

4.2.1 Archaeological features were encountered in all of the trenches with the exception of Trenches 1, 6 and 10.

4.3 Description of deposits

Trench 1 (Fig. 3)

4.3.1 The natural chalk (103) was revealed at a depth of 0.90 m below ground level (bgl) in the west end of the trench (11.01 m OD) and 0.80 m bgl in the east end of the trench (10.13 m OD). No archaeological features were seen, although a 0.8 m deep depression in the upper surface of 103 was seen, filled with a grey brown, clay loam buried soil (105), containing fragments of Roman tile. This feature may have been a natural channel, a hollow-way, or perhaps suggests large scale quarrying. Overlying this soil was the subsoil (102) below a topsoil (101).

Trench 2 (Fig. 4)

4.3.2 In Trench 2 natural gravel (202) was encountered at a depth of 11.40m OD (0.50 m bgl). At the north end of the trench a ditch, a gully and a tree hole were seen. Ditch 206 was aligned north-east to south-west, and was 1 m wide and 0.24 m deep, with a slightly rounded base. It was filled with a brown silty sand (205), which contained a sherd of probably 1st-2nd century pottery and a ?Neolithic flint flake. Gully 208 was on the same alignment, 0.50 m wide, 0.08 m deep and filled with a brown silty sand (207). The tree hole (210) was irregular in plan with a flat base and steep sides, 0.16 m deep and 1.70 m x 1 m across. It was filled with a dark brown sandy silt (209) with roots still present, which contained a fragment of Roman tile and an oyster shell. A subsoil (204) overlay the fills of these features, and was in turn overlain by the topsoil (201).

Trench 3 (Fig. 5)

4.3.3 Natural sand (303) was seen at 10.26 m OD (0.80 m bgl) in the north end of the trench and at 10.46 m OD (0.60 m bgl) in the south end of the trench. In the north end of the trench were a series of quarry holes (306, 308, 310 and 313), which were flat based, steep sided and filled with grey sandy silts (304, 305, 307, 309, 311 and 312). Fill 304 contained pottery dating from the 1st-2nd century; animal bone was retrieved from 311, a flint flake from 309, an end and side scraper and a blade-like flake from 305. The quarry holes were intercutting but no relationship could be determined between the southerly pit (308) and a shallow ditch (315). The ditch was east-west aligned, 0.55 m wide, 0.06 m deep and filled with a grey brown sandy silt (314). In the south end of the trench was a ditch terminus (317) aligned north south, which was 0.50 m wide, 0.12 m deep and filled by a light grey brown sandy silt (316). Overlying the fills of these features was a subsoil, 302 and then a topsoil, 301.

Trench 4 (Fig. 6)

4.3.4 In the west end of the trench the natural sandy clay (404) was at 8.75 m OD (0.90 m bgl) and in the east at 8.07 m OD (0.70 m bgl). In the east of the trench an east-west aligned gully was encountered (407). This had steep sides and a flat base, and was 0.35 m wide and 0.15 m deep. It was filled with a grey brown silty clay (408). Another ditch (409), was seen, aligned north-south and measuring 2 m wide and 0.35

m deep. It was filled with a light grey brown silty clay below a dark grey brown fill (410 and 411). Animal bone and a Neolithic retouched flake were retrieved from fill 411. Ditch 412 was aligned north-west to south-east, 1.40 m wide, 0.25 m deep and filled with a light grey brown silty clay below a dark grey brown fill (413 and 414). Fill 413 contained pottery dating to the 1st to early mid 2nd century, and a Neolithic blade, 414 contained pottery dating to the 1st to 2nd century and a Neolithic end and side scraper. Ditch 416 was on the same alignment but more irregular, and was 0.70 m wide and 0.40 m deep. The ditch was backfilled with a dark grey sandy silt (415) with a lot of animal bone and 1st-2nd century pottery; the size of the bone suggests that the feature is post medieval (see 5.3). The easterly uppermost fills were overlain by 403, a grey brown silty clay buried soil, containing ?1st-2nd century pottery and burnt clay. This was overlain by subsoil 402 and topsoil 401.

Trench 5 (Fig. 7)

4.3.5 Natural sandy clay (503) was seen in the north end of the trench at 7.35 m OD (0.75 m bgl) and 8.04 m OD in the south end of the trench (0.65 m bgl). At the north end was a ditch (514), which was aligned north-south, and was 0.10 m deep, over 0.55 m wide and filled with a light grey brown silty clay (515). A Neolithic flint flake and ?1st-2nd century pottery were recovered from fill 515. Further south, two more ditches were seen, both aligned east-west (516 and 521). Ditch 516 was 0.25 m deep, 0.60 m wide and filled with a dark grey blue, silty clay (517), containing 1st to 2nd century pottery, and Roman tegula (roof tile). Ditch 521 was 1.30 m wide, 0.40 m deep and filled with a blue grey sandy clay below a reddy brown sandy clay (522 and 523). Fill 522 contained a Neolithic flint flake and undated tile. At the south end of the trench was a small post hole (524), 0.60 m in diameter and 0.20 m deep. It was filled with dark grey brown silty clay which contained some burnt flints (525). A dark grey brown buried soil (509) overlay the upper fills of the features. This deposit was cut by ditch 518, which was aligned east west, and was 1.80 m wide, 0.80 m deep and filled with light and dark grey brown silty clays (519 and 520). Fill 520 contained late 2nd century pottery, animal bone, a Neolithic flint flake and a blade-like flake. Overlying 520 was subsoil 502 and then topsoil 501.

Trench 6 (Fig. 8)

4.3.6 In the north of the trench the natural gravelly clay (602) was at 6.89 m OD (1.10 m bgl) and in the south end of the trench at 7.32 m OD (0.80 m bgl). A modern feature (604) was cut into the gravel, over 20 m long and 1.50 m deep. It was backfilled with 605, a dark brown silty clay with gravel lenses, containing modern bricks and iron pipes. Overlying fill 605 was the modern topsoil (601).

Trench 7 (Fig. 9)

4.3.7 The natural gravel (703) was seen at 10.21 m OD (0.80 m bgl) in the west of the trench and 9.59 m OD (1.10 m bgl) in the east of the trench. A ditch (708) was seen running north-south across the centre of the trench, and was 1.30 m wide, 0.40 m deep and filled with a light grey silty sand (707). This fill contained animal bone,

daub, undated tile and a Neolithic retouched flint flake. A tree hole (710) was seen in the west end of the trench.

Trench 8 (Fig.10)

4.3.8 A plough disturbed silty sand natural (803) was seen at 10.29 m OD (0.95 m bgl) in the north end of the trench and 10.12 m OD (1.10 m bgl) in the south end of the trench. This was cut by ditch 809, aligned north-south, which was over 1.05 m wide, 0.70 m deep and filled with 808, a light grey clay sand, and 810 a light brown silty sand. Animal bone, ?Iron Age pot and Roman tegula (roof tile) were retrieved from fill 808. Overlying 810 was the subsoil (811) and then the topsoil (802).

Trench 9 (Fig. 11)

4.3.9 The plough disturbed silty sand natural (903) was seen to the north of the trench at 10.50 m OD (0.90m bgl) and in the south of the trench at 10.09 m OD (0.90 m bgl). A ditch (907) was seen running almost the full length of the trench, and aligned north-south; the ditch was over 1.30 m wide, 0.60 m deep and was filled with a light grey silty sand (906) and a light brown sandy silt (905). Both fills contained animal bone and Roman tile. Fill 905 also contained a single sherd of possibly intrusive post medieval pottery. At the southern end of the trench was a roughly circular feature, either a pit or a tree hole, measuring 1.4 m in diameter and 0.3 m deep. It was filled with a silty sand (908), which contained two flint flakes. Overlying 905 and 908 was a subsoil (902) below a topsoil (901).

Trench 10 (Fig. 12)

4.3.10 The natural clay sand (1003) was seen at 10.01 m OD (1.20 m bgl) in the west of the trench and at 9.18 m OD (1.50 m bgl) in the east of the trench. A dark blue grey, sandy clay subsoil (1007) overlay the natural and in turn was overlain by 1006, a light grey brown, sandy clay subsoil. Over 1006 was 1005, a light grey brown, sandy clay buried plough soil. Tile was observed in layer 1005. Over 1005 was a modern subsoil (1002) below a topsoil (1001).

Trench 11 (Fig. 13)

4.3.11 Natural sand (1102) was encountered at 9.36 m OD (0.80 m bgl) in the north end of the trench and at 9.44 m OD (1 m bgl) in the south end of the trench. Three east-west aligned ditches were seen in the southern half of the trench. Ditch 1115 was 0.65 m wide, 0.20 m deep and filed with a grey sandy silt (1114), containing animal bone and tile. Ditch 1110 was 0.70 m wide, 0.21 m deep and filled with a dark grey sandy clay (1109). Fill 1109 was cut by ditch 1108, which was 1.25 m wide, 0.60 m deep and filled with a grey sandy silt (1107), below a mottled reddish brown sandy silt (1106). Fill 1106 contained 1st to 2nd century pottery and undated tile, animal bone and a Neolithic flint flake. In the north of the trench was pit 1113, which was 2.20 m in diameter, 0.70 m deep and filled with a grey sandy silt (1112) below a reddish brown mottled sandy silt (1111). Fill 1112 contained 1st to 2nd century pottery.

5 FINDS

5.1 Iron Age/Roman pottery, *by Paul Booth*

Introduction

5.1.1 The evaluation produced 26 sherds of Iron Age and Roman pottery weighing 395 grammes.

5.1.2 The pottery was recorded by context in terms of broad fabric categories for the purposes of assigning dates, with quantification by sherd count and weight. Vessel type, where identifiable, was also recorded, and other characteristics were noted as appropriate. Coding followed the standards established in the OAU prehistoric and Roman pottery recording system. The pottery was generally in moderate condition. While the average sherd weight was relatively high (14 g) some pieces were quite abraded. Preservation of surfaces (owing to soil conditions) ranged from good to poor.

Fabrics, forms and chronology

5.1.3 Two probable Iron Age sherds were present, one each in flint-tempered and quartzite-tempered fabrics. The latter, with a roughly ridged surface, was the only sherd from ditch fill 808 and may indicate an Iron Age date for this feature.

5.1.4 Quantification of the Roman material by broad fabric type was as follows:

- S30. ?Central Gaulish samian ware. 1 sherd, 76 g.
- Q. Fine oxidised white-slipped ware. 1 sherd, 1 g.
- O10. Fine oxidised 'coarse' wares. 2 sherds, 26 g.
- O50. Sandy oxidised coarse wares (?Canterbury). 5 sherds, 109 g.
- O80. Coarse- (grog-) tempered oxidised ware (?Patchgrove). 1 sherd, 30 g.
- R. General reduced coarse wares (undifferentiated). 2 sherds, 23 g.
- R10. Fine reduced 'coarse' wares. 3 sherds, 53 g.
- R30. Moderately sandy reduced coarse wares. 7 sherds, 46 g.
- C10. Shell-tempered wares (North Kent). 2 sherds, 13 g.

5.1.5 The Roman material appeared to date largely if not entirely to the 1st and 2nd centuries AD, though chronologically diagnostic material was scarce. Fine and specialist wares were represented by a single large sherd of samian ware - a Drag 45 mortarium, probably Central Gaulish - and a tiny fragment of a fine oxidised white-slipped fabric. The remaining coarse wares were mostly in sand-tempered oxidised and reduced fabrics with two shell-tempered sherds in a North Kent tradition. The majority of the reduced ware sherds were probably also from North Kent, while the oxidised wares probably included Canterbury products and a single sherd of Patchgrove Ware.

5.1.6 Four vessels were represented by rim sherds. These were the Drag 45 already mentioned and three reduced vessels, two jars and a lid. Of these only one of the jars, a bead-rimmed type of Monaghan (1987) form 3E3.2, is particularly distinctive and dated c AD 10/40-150. The other forms (and the fabrics present) are consistent with a

1st-2nd century date range, though it is possible that this might have extended a little later.

5.1.7 All the pottery derived from fills of ditches and of a quarry pit (context 304).

Table 1: Summary of Roman pottery by context

Context	*No. of sherds*	*Weight (g)*	*Date*	*Fabrics/forms*
205	1	3	?1-2C	R30
304	6	89	?1-2C	Q, O50, R, R30
403	2	21	?1-2C	R10, R30
413	2	26	1-e/m 2C	R, C10; R jar rim Mon 3E3.2 (10/40-150)
414	2	32	1-2C	O10, O80
415	3	31	1-2C	R10, R30, C10
516	2	13	?1-2C	1 IA (flint-tempered); R30 ?jar rim cf e.g. Mon 3A3.2 or 4G2.2
517	2	29	?1-2C	O10, R30
520	1	76	late 2C	?S30 (Drag 45; date range into early 3C if East Gaulish)
808	1	15	IA?	quartzite and sand tempered
905	1	46	?2C	O50 flagon handle
1106	1	2	?1-2C	O50
1112	2	12	?1-2C	O50, R30; R30 lid (Mon type 12C2)
Total	26	395		

Note: Mon = Monaghan

5.2 Ceramic building material, *by Paul Booth*

Introduction and Quantification

5.2.1 Some 59 fragments (5825 g) of ceramic building material were recovered, of which a minimum of 97.6% (by weight) was of Roman date. The material was scanned rapidly and assigned to period and (for the Roman material) to tile type where possible. Quantification was by number of fragments and weight (g). Fabrics were not systematically examined. The material is tabulated by context in terms of the groupings already mentioned (see Table 2). Fragments of uncertain date were all small and undiagnostic. It is likely that the majority of these were Roman, but this could only be established through detailed examination of the fabrics of all the material. The fabrics present included at least one with a high sand content, though the majority of tiles appeared to be in fabrics with relatively sparse quartz sand inclusions.

5.2.2 The main Roman tile type present was tegula, though it is possible that material assigned to this category included a few plain fragments from box flue tiles. Only one piece of the latter, with characteristic combing, was certainly identified. A small number of pieces were assigned to a 'plain flat' category. These were characteristically thicker (c 25-30 mm) than typical tegulae, but less thick than the three fragments defined as 'brick' - here usually over 35 mm thick.

5.2.3 The average weight of the Roman tile fragments is relatively high (c 135 g). This and the relatively unabraded nature of most of the fragments suggests that they derive from a Roman building situated quite close to the site.

Table 2: Ceramic building material by context (quantities expressed as fragment count/weight (g))

Period	Uncer-tain	Roman						Post-Roman
		Tile type						
Context		*A Tegula*	*B Imbrex*	*C Box flue*	*D Plain flat*	*E Misc frags*	*F Brick*	
105		2/166?			1/132			
209		1/106?			1/212			
304		5/1350	1/55		1/214	2/38	1/220	
517		2/468						
522	2/12							
702		2/202?						
707	1/7							
709	4/18							
808		4/530						
811	1/4	1/104						
902								2/43
905		3/420	1/88			5/84		
906		3/408		1/43			2/602	
1105	2/29	1/86	1/38					
1106	1/2							
1107	4/22							
1116					1/122			
Total	15/94	24/3840	3/181	1/43	4/680	7/122	3/822	2/43
'Period' total	**15/94**	**42/5688**						**2/43**

5.3 Animal bone, *by Beth Charles*

Introduction and Quantification

5.3.1 A total of 199 (2827g) fragments of bone were recovered from the evaluation. Almost all of the bone had fresh breaks and many of the fragments were re-assembled, reducing the fragment count to 114. From this number 28 were identified to species. The majority of the unidentified bone (62 fragments) came from context 415, and are almost certainly small fragments from the identified but fragmented cattle bone recovered from the same deposit.

5.3.2 Although the bone was quite fragmentary it was in reasonable condition with little attritional damage. Only six of the bones had clear butchery marks. None of the bones had been burnt or had signs of pathological changes and only one cattle metatarsal from context 906 had signs of carnivore tooth marks.

5.3.3 All of the bone from the site is from contexts provisionally dated as Romano-British; these are mostly ditch fills.

Methodology

5.3.4 The calculation of the species recovered from the site was done through the use of the total fragment method. All fragments of bone were counted including elements from the vertebral centrum, ribs and long bone shafts.

5.3.5 It was attempted to separate the sheep and goat bones using the criteria of Boessneck (1969), Prummel and Frisch (1986) in addition to the use of the reference material housed at the OAU. However, since no goat bones were positively identified all caprine bones have been recorded as sheep.

5.3.6 The ageing of the animals was based on epiphyseal fusion, due to lack of mandible fragments with teeth (which would have enabled ageing from tooth wear stages). Silver's (1969) tables were used to give timing of epiphyseal closure for cattle, sheep, pigs and horses.

5.3.7 Measurements taken were those defined by von den Driesch (1976).

5.3.8 Due to the small number of indicative fragments recovered from the site the ageing data as well as some of the measurements have not been included in the assessment. All information can be found in the primary record sheets, which form part of the archive.

Results

5.3.9 It can be seen in **Table 3** that cattle appear to have been the most dominant species at the site. However, the majority of the cattle bone (11 fragments) came from context 415 and may be the remains of a single skeleton. The only sheep and pig fragments included sheep rib, vertebrae and mandible fragments and a pig metatarsal. Part of what appears to have been the remains of a dog mandible was found in context 1106. However, it could not be fitted together and has been counted as 3 fragments.

Table 3: Total number of bones according to identification

Species	*Cattle*	*Sheep*	*Pig*	*Dog*	*Unidentified*	*Total*
Total	21	3	1	3	86	114

Conclusion and Recommendations

5.3.10 The small number of identified bone from the excavation thus far does not provide significant information regarding the economy of the site during the Romano-British period other than the presence of the animals. However, the condition of the bone is reasonably good and does indicate that further excavations may provide more information on the economy and animal husbandry techniques practised at the site.

5.4 **Lithics, *by Hugo Lamdin-Whymark***

Introduction

5.4.1 A total of 18 flints and 7 pieces/236g of burnt unworked flint were recovered from

the evaluation. Technologically the flintwork appeared to be Neolithic and the fresh condition suggests the material is in-situ or moved very little from its original location. Table 4 shows the flint assemblage by category.

Table 4: The flint assemblage by category

CATEGORY TYPE	*Total*
Flake	9
Blade	1
Blade-like	2
Multiplatform flake core	1
End and side scraper	2
Retouched flake	3
Burnt unworked	7
Grand Total	25

5.4.2 A further single flint flake was found during the evaluation of the Palaeolithic deposits (see Appendix 2). It constituted the broken distal end of a blade and was unpatinated and in fairly fresh condition.

Condition

5.4.3 The majority of the flint recovered was in a very fresh condition, although a couple of flints with post depositional edge damage were also present. The exceptional preservation of the flintwork suggests that the majority of pieces were in-situ or have moved only slightly from their original location. The flintwork in the assemblage was uncorticated.

Raw Material

5.4.4 The raw material used for the flintwork originated from the river gravels, most probably from a local source. The flint was mid brown to grey and the cortexes were generally thin and abraded, and usually grey in colour.

Methodology

5.4.5 The artefacts were catalogued according to broad artefact/debitage type, with general condition noted and dating attempted where possible. Unworked burnt flint was quantified by piece and weight.

The Assemblage

5.4.6 The assemblage (Table 5) is composed of a mixture of flakes, blades and blade-like flakes struck using both hard and soft hammer percussors. Platform edge abrasion was present on a few of the flakes. The multi-platform flake core was both burnt and broken and few technological observations could be made. The retouched component of the assemblage consists of five flints. The two end and side scrapers were both manufactured on flakes and each exhibits abrupt retouch along two edges. The three retouched flakes exhibited only limited areas of slight abrupt edge retouch. The absence of diagnostic artefacts and limited size of the assemblage hinders dating. However, the technology employed suggests the assemblage is Neolithic in date, although at present this date cannot be refined.

Conclusions

5.4.7 Although a relatively small assemblage this material is of considerable interest. The condition of the material is exceptionally fresh; a state usually only encountered within in-situ deposits preserved in relatively fine sediments, such as within peat in the Ebsfleet Valley (Lamdin-Whymark, 2000). The possibility of in-situ Neolithic deposits, within these trenches or in close proximity to them (if these pieces are redeposited) has therefore to be considered.

Table 5: The flint by context and category type

	Context																		
CATEGORY TYPE	205	304	305	309	403	410	413	414	516	520	522	707	905	906	908	1106	1114	Grand Total
Flake	1			1	1				1	1	1				2	1		9
Blade							1											1
Blade-like			1							1								2
Multiplatform flake core													1					1
End and side scraper			1					1										2
Retouched flake						1						1	1					3
Burnt unworked		2	2										1	1			1	7
Grand Total	1	2	4	1	1	1	1	1	1	2	1	1	3	1	2	1	1	25

6 DISCUSSION AND INTERPRETATION

6.1 Reliability of field investigation

6.1.1 The positioning of the trenches in the evaluation covered a good proportion of Site A, although the southern half of the site was less comprehensively sampled. Archaeological features were seen in almost all of the trenches and a reasonable amount of artefactual evidence was recovered, suggesting a level of agricultural and possibly domestic activity in the area. There appeared to be very little truncation of archaeological deposits by modern intrusions, although ploughing has truncated features in the west of the site. The results obtained from the evaluation appear to offer reliable evidence of medium-level rural activity in the early Roman period.

6.2 Overall interpretation

Summary of results (Fig. 2)

6.2.1 The archaeology encountered consisted of a series of ditches running east-west or north-south. It can be assumed that ditches 809 and 907 form parts of the same north-south aligned ditch running along the western edge of the site. Although a sherd of post-medieval pottery was retrieved from fill 905 it is possible that this is intrusive and that the ditch is Roman in date. Ditch 412 and 514 would appear to be part of a single Roman ditch running north-west to south-east across the eastern edge of the site. In Trenches 5 and 11 there are three roughly parallel ditches aligned east-west through the centre of the site. Ditches 1115 and 516 appear to be elements of a single feature, as do ditches 521 and 1108; however, 518 and 1110, the southerly ditches,

are apparently different features. In Trench 5, 518 is stratigraphically later than the other two east-west ditches, whilst in Trench 11, 1110 is truncated by 1108 and much narrower and shallower than its possible counterpart 518. It may be possible that 1110 runs through to Trench 5 and is obscured by ditch 521, whilst ditch 518 must turn and so is not seen in Trench 11. All the ditches are 1st or 2nd Century in date, where dating evidence was recovered, as are the remaining unassociated ditch sections, 317, 409, 416 and 708 and running in a north-southerly direction and 208, 206, 315 and 407 in an east-westerly direction. These features are likely to constitute the ditches and gullies of a field systems and possibly settlement boundaries in the area. It can be assumed by the quantities of tile found predominantly in the westerly ditch sections that the systems are associated with the Roman buildings found 150 m to the north-west and the Roman villa found 150 m to the west of the site (see 1.3.3).

6.2.2 The only other feature of archaeological significance is a large pit, 1113, found to the north of ditch 1115 in Trench 11. It would appear to be Roman in date but is of unknown function. It may be possible that it is one of a group which have been missed in the central northern part of the site.

6.2.3 The small but fresh flint assemblage would suggest that in-situ Neolithic deposits are in close proximity to the site, and may be associated with later prehistoric remains 150 m to the north-west of the site.

Significance

6.2.4 The evaluation revealed features of a local significance. These are interpreted as part of a Romano-British field system which may be associated with Roman buildings and a villa thought to lie the north-west and west of the site. It may also be assumed that there is an area of Neolithic activity in close proximity to the site.

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APPENDICES

APPENDIX 1 ARCHAEOLOGICAL CONTEXT INVENTORY

Trench	*Ctxt No*	*Type*	*Width (m)*	*Thick. (m)*	*Comment*	*Finds*	*Date*
1							
	101	deposit		0.4	topsoil		modern
	102	deposit		0.4	subsoil		modern
	103	deposit			natural		
	104	deposit			natural		
	105	deposit		0.8	buried soil	cbm	Roman
	106	deposit		0.4	topsoil		modern
	107	deposit		0.4	subsoil		modern
	108	deposit			natural		
	109	deposit			natural		
	110	deposit			natural		
	111	deposit			natural		
2							
	201	deposit		0.35	topsoil		modern
	202	deposit			natural		
	203	deposit			natural		
	204	deposit		0.2	subsoil		modern
	205	deposit	1	0.24	fill of 206	pot, flint	?1st-2nd C
	206	cut	1	0.24	ditch		Roman
	207	deposit	0.5	0.08	fill of 208		
	208	cut	0.5	0.08	gully		
	209	deposit	1.7x1	0.16	fill of 210	cbm	Roman
	210	cut	1.7x1	0.16	tree hole		
3							
	301	deposit		0.4	topsoil		modern
	302	deposit		0.6	subsoil		modern
	303	deposit			natural		
	304	deposit		0.34	fill of 306	pot, bone, flint, cbm	?1st-2nd C
	305	deposit		0.4	fill of 306	flint	
	306	cut	2.8	0.75	quarry pit		
	307	deposit		0.5	fill of 308		
	308	cut	1.2	0.6	quarry pit		
	309	deposit		0.48	fill of 310	flint	
	310	cut	0.5	0.5	quarry pit		
	311	deposit		0.38	fill of 313	bone	
	312	deposit		0.32	fill of 313		
	313	cut	1.5	0.7	quarry pit		
	314	deposit		0.06	fill of 315		
	315	cut	0.55	0.06	ditch		
	316	deposit		0.12	fill of 317		
	317	cut	0.5	0.12	ditch		
4							
	401	deposit		0.4	topsoil		modern
	402	deposit		0.3	subsoil		modern
	403	deposit		0.3	buried soil	pot, flint	?1st-2nd C
	404	deposit		0.6	natural		holocene

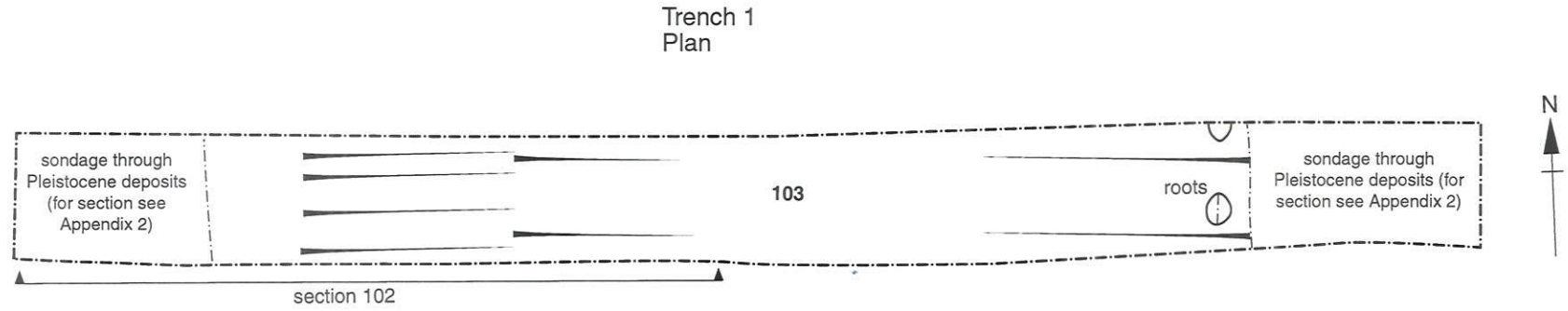
Trench	*Ctxt No*	*Type*	*Width (m)*	*Thick. (m)*	*Comment*	*Finds*	*Date*
	405	deposit			natural		
	406	deposit			natural		
	407	cut	0.35	0.15	gully		
	408	deposit		0.15	fill of 407		
	409	cut	2.1	0.35	ditch		
	410	deposit		0.35	fill of 409	bone/flint	
	411	deposit		0.25	fill of 409		
	412	cut	1.4	0.25	ditch		
	413	deposit		0.25	fill of 412	pot, flint	1st-early/mid 2nd C
	414	deposit		0.2	fill of 412	pot, flint	1st-2nd C
	415	deposit		0.4	fill of 416	pot, bone	1st-2nd C
	416	cut	0.7	0.4	ditch		
5							
	501	deposit		0.3	topsoil		modern
	502	deposit		0.4	subsoil		modern
	503	deposit		0.4	natural		holocene
	504	deposit			natural		
	505	deposit			natural		
	506	deposit			natural		
	507	deposit		0.3	topsoil		modern
	508	deposit		0.4	subsoil		modern
	509	deposit		0.25	buried soil		Roman
	510	deposit			natural		
	511	deposit			natural		
	512	deposit			natural		
	513	deposit			natural		
	514	cut	>0.55	0.1	ditch		Roman
	515	deposit		0.1	fill of 514	pot	?1st-2nd C
	516	cut	0.6	0.25	ditch		
	517	deposit		0.25	fill of 516	pot, flint, cbm	?1st-2nd C
	518	cut	1.8	0.5	ditch		Roman
	519	deposit		0.25	fill 518		Roman
	520	deposit		0.25	fill of 518	pot, bone, flint	late 2nd C
	521	cut	1.3	0.4	ditch		Roman
	522	deposit		0.25	fill of 521	flint, cbm	Roman
	523	deposit		0.15	fill of 521		Roman
	524	cut	0.5	0.2	post hole		
	525	deposit		0.2	fill of 524		
6							
	601	deposit		0.7	topsoil		modern
	602	deposit			natural		
	603	deposit			natural		
	604	cut	20	1.5	demolition		modern
	605	deposit		1.5	fill of 605		modern
7							
	701	deposit		0.25	topsoil		modern
	702	deposit		0.5	subsoil	cbm	modern

Trench	*Ctxt No*	*Type*	*Width (m)*	*Thick. (m)*	*Comment*	*Finds*	*Date*
	703	deposit			natural		
	704	deposit			natural		
	705	deposit			natural		
	706	deposit		0.25	buried soil		
	707	deposit		0.4	fill of 708	bone, flint, cbm, daub	
	708	cut	1.3	0.4	ditch		Roman
	709	deposit		0.5	fill of 710	cbm	
	710	cut	1.3x0.35	0.5	tree hole		
8							
	801	deposit		0.1	tyre marks		modern
	802	deposit		0.3	topsoil		modern
	803	deposit		0.25	natural		
	804	deposit		0.25	natural		
	805	deposit			natural		
	806	deposit			natural		
	807	deposit			natural		
	808	deposit		0.4	fill of 809	pot, cbm, bone	Roman
	809	cut	>1.05	0.7	ditch		Roman
	810	deposit		0.3	fill of 809		
	811	deposit		0.5	subsoil	bone, cbm	modern
9							
	901	deposit		0.3	topsoil		modern
	902	deposit		0.35	subsoil	cbm	modern
	903	deposit		0.4	natural		
	904	deposit			natural		
	905	deposit		0.25	fill of 907	pot, bone, flint, burnt flint, cbm	?2nd C
	906	deposit		0.3	fill of 907	bone, burnt flint, cbm	
	907	cut	1.3	0.6	ditch		
	908	deposit		0.3	fill of 909	flint	
	909	cut	1.4x0.9	0.3	tree hole		
10							
	1001	deposit		0.4	topsoil		modern
	1002	deposit		0.4	subsoil		modern
	1003	deposit			natural		
	1004	deposit			natural		
	1005	deposit		0.25	buried soil		Roman
	1006	deposit		0.4	buried soil		
	1007	deposit		0.3	buried soil		
11							
	1101	deposit		0.3	topsoil		modern
	1102	deposit			natural		
	1103	deposit			natural		
	1104	deposit			natural		
	1105	deposit		0.6	subsoil	cbm	modern

Trench	*Ctxt No*	*Type*	*Width (m)*	*Thick. (m)*	*Comment*	*Finds*	*Date*
	1106	deposit		0.2	fill of 1108	pot, cbm, bone, flint	?1st-2nd C
	1107	deposit		0.36	fill of 1108	cbm	Roman
	1108	cut	1.25	0.6	ditch		Roman
	1109	deposit		0.21	fill of 1110		
	1110	cut	0.7	0.21	ditch		
	1111	deposit		0.28	fill of 1113		
	1112	deposit		0.4	fill of 1113	pot, cbm	?1st-2nd C
	1113	cut	2.2	0.7	pit		Roman
	1114	deposit		0.16	fill of 1115	bone, burnt flint, cbm	
	1115	cut	0.65	0.2	ditch		Roman
	1116	deposit		0.25	buried soil	cbm	Roman

Figure 1: Site location.

Figure 2: Trench locations relative to proposed development, showing elements of Romano-British field system.



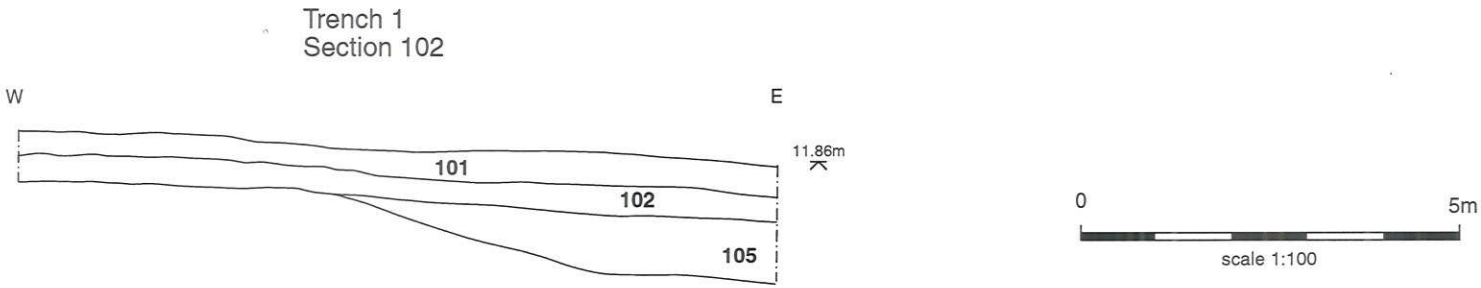


Figure 3: Trench 1, plan and section

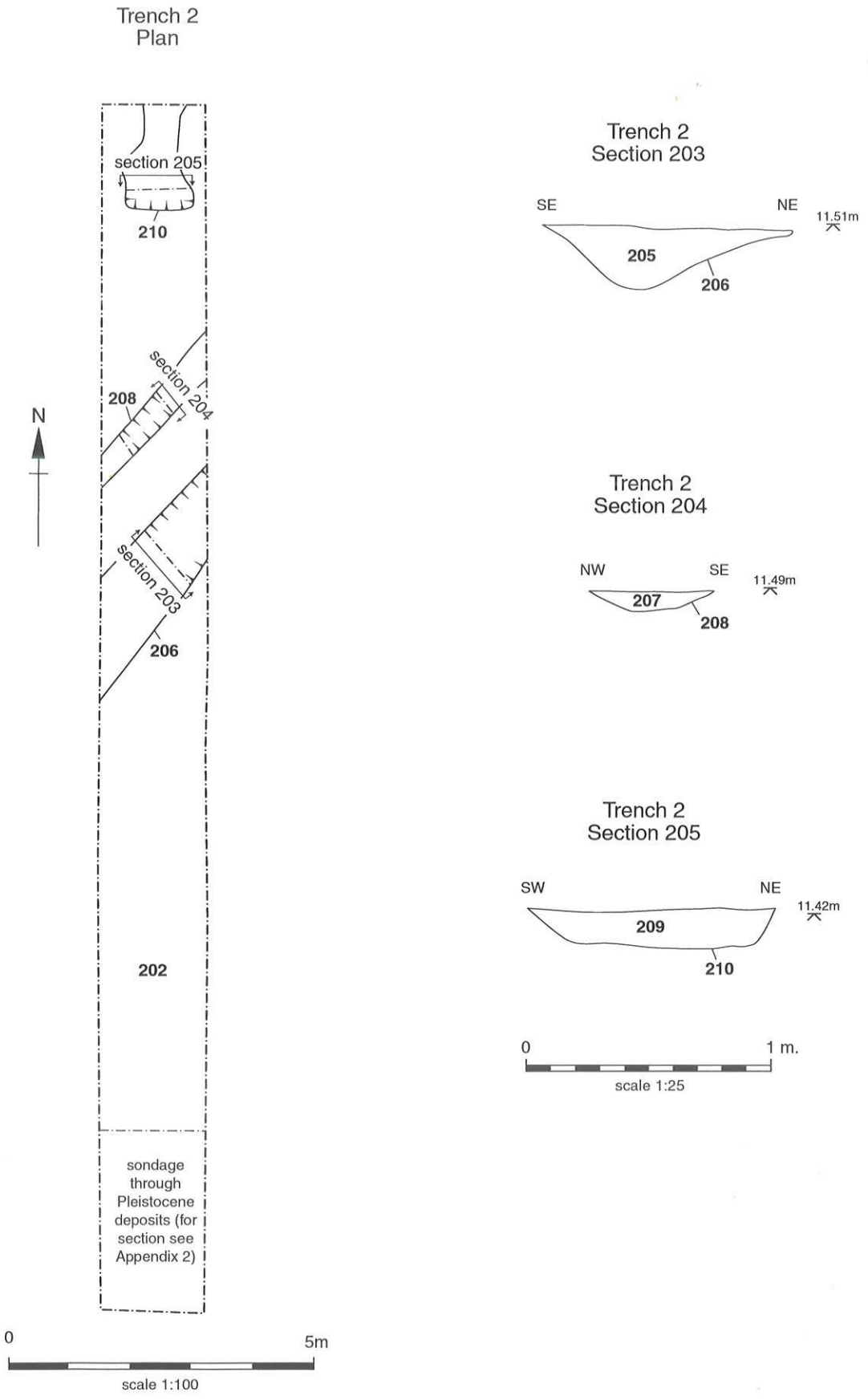


Figure 4: Trench 2, plan and sections

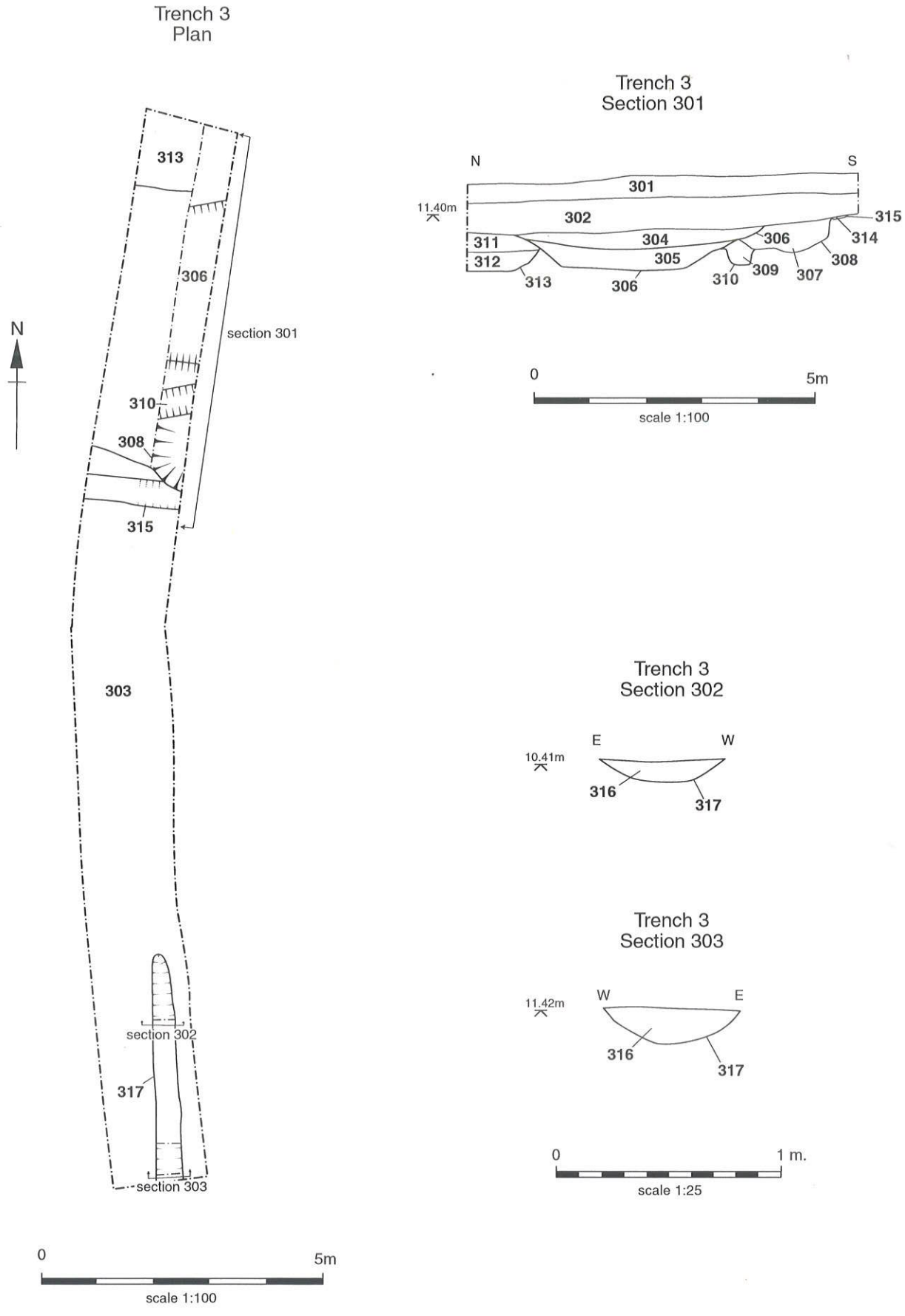


Figure 5: Trench 3, plan and sections

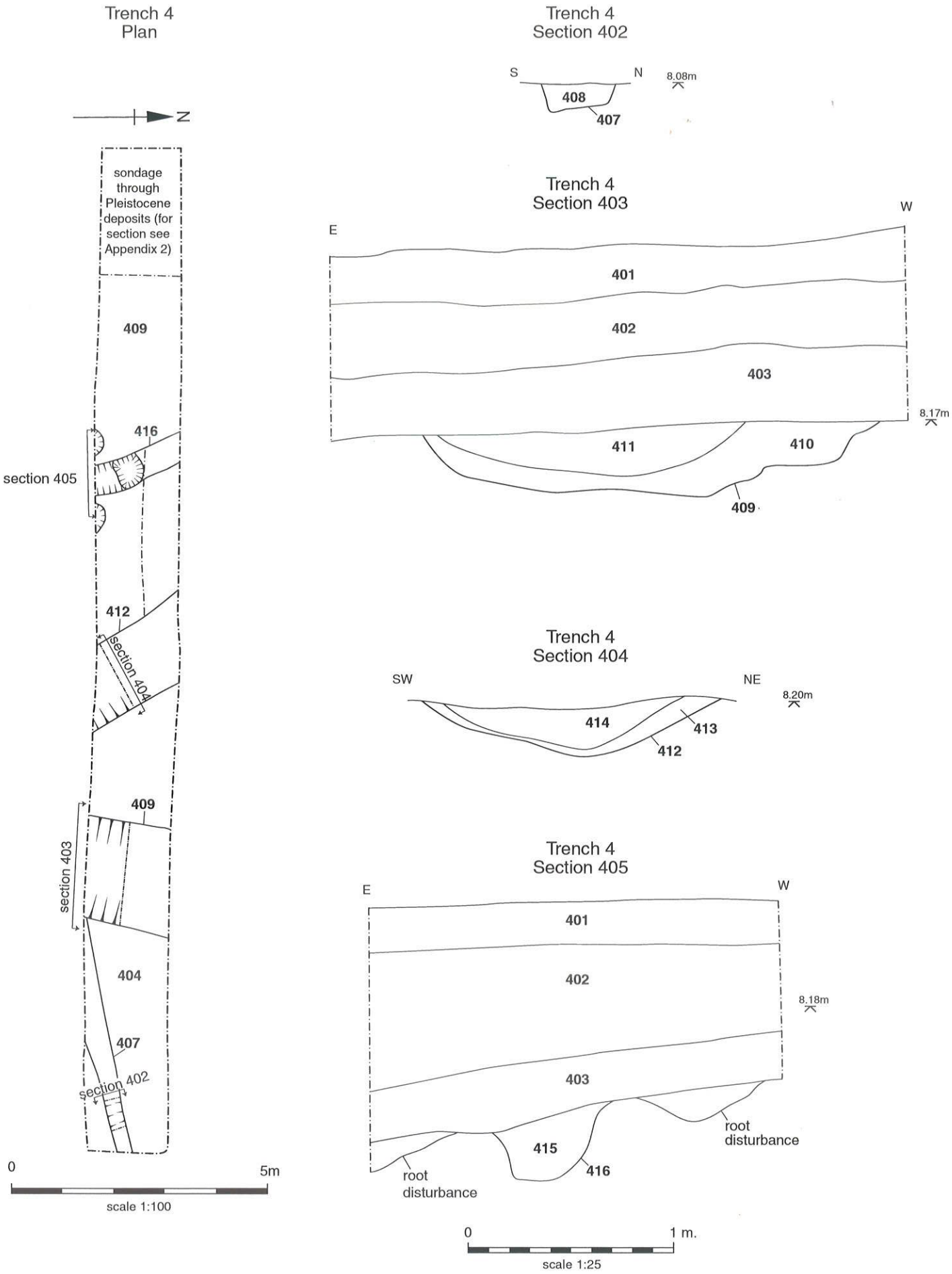


Figure 6: Trench 4, plan and sections

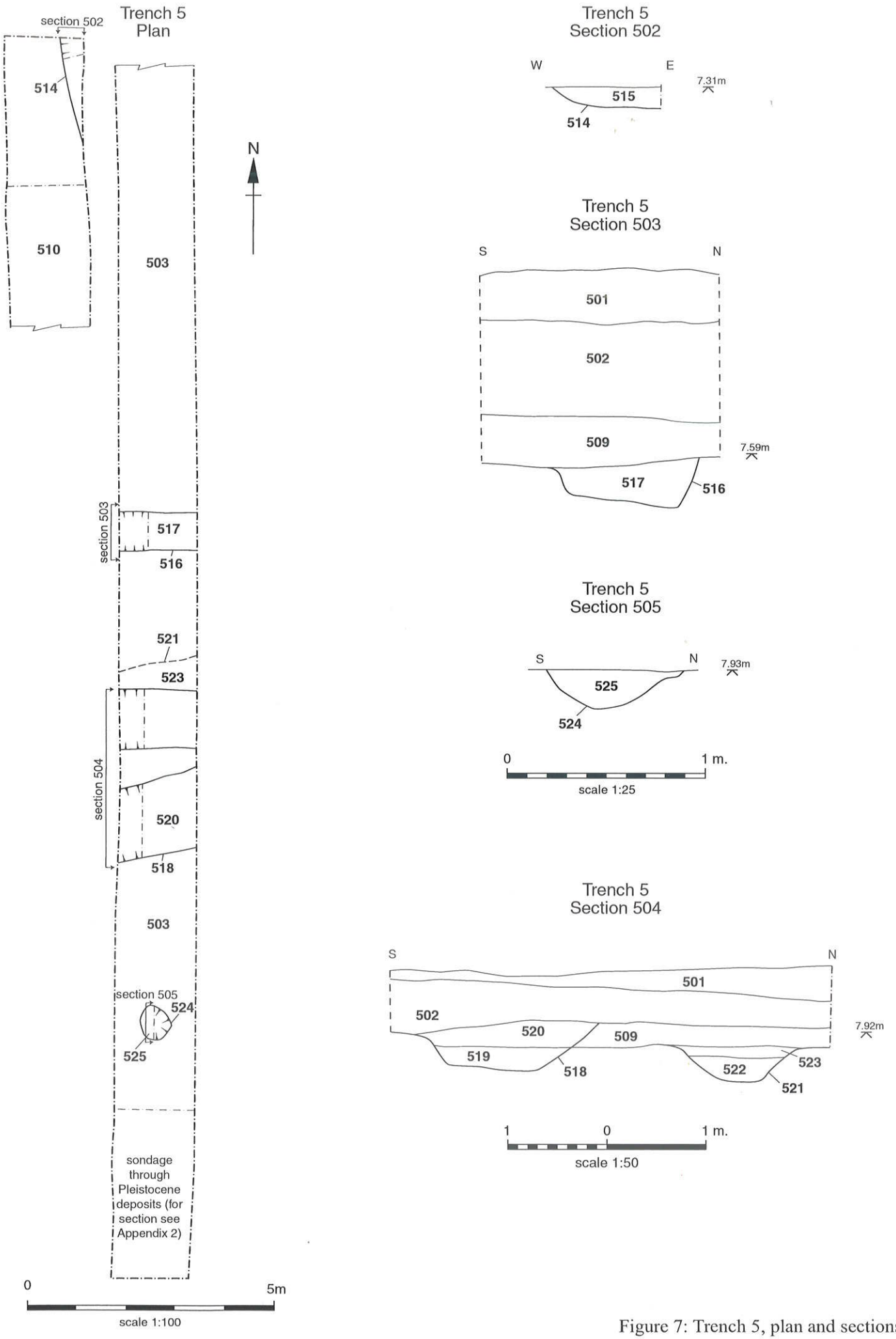


Figure 7: Trench 5, plan and sections

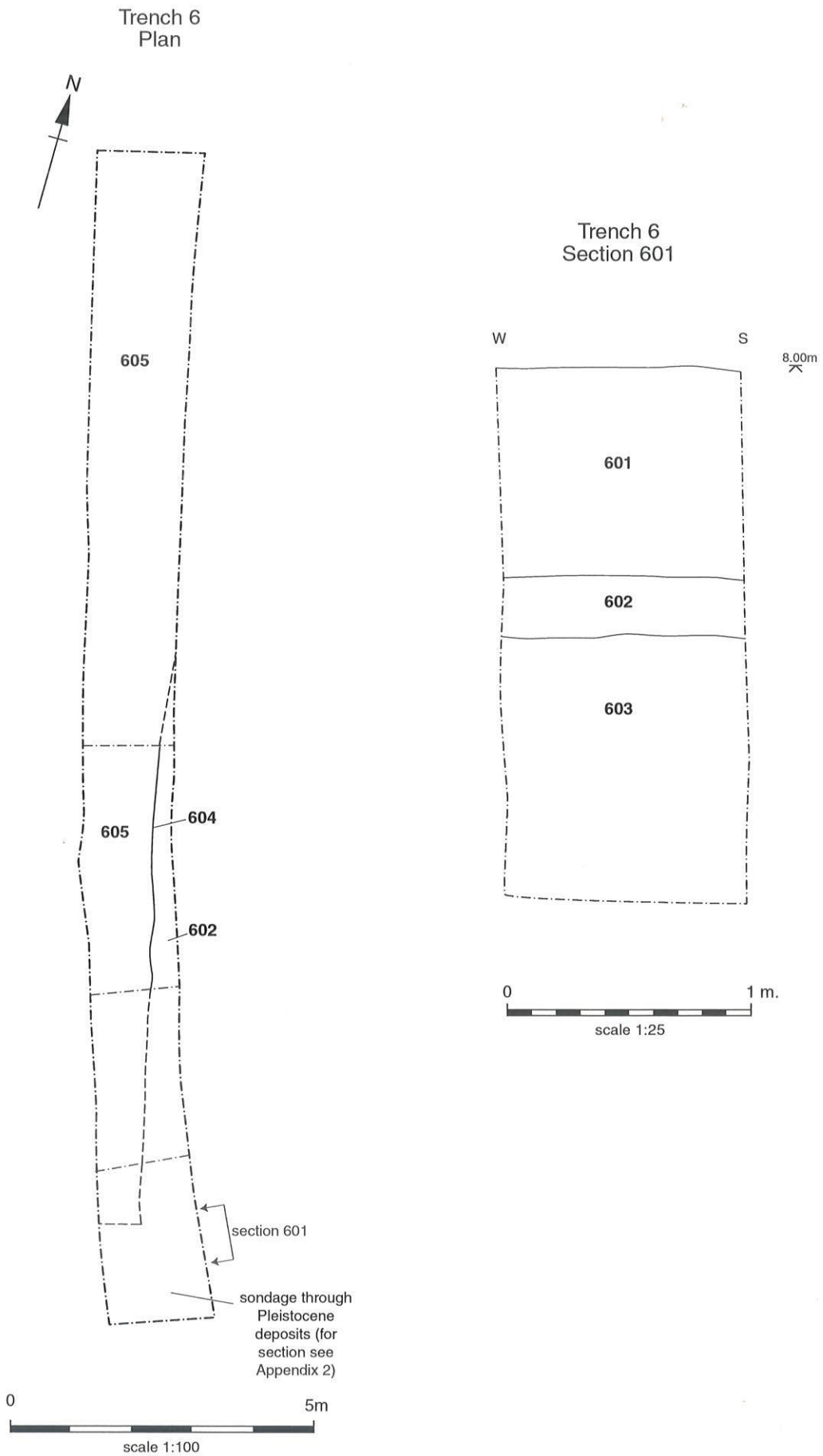


Figure 8: Trench 6, plan and section

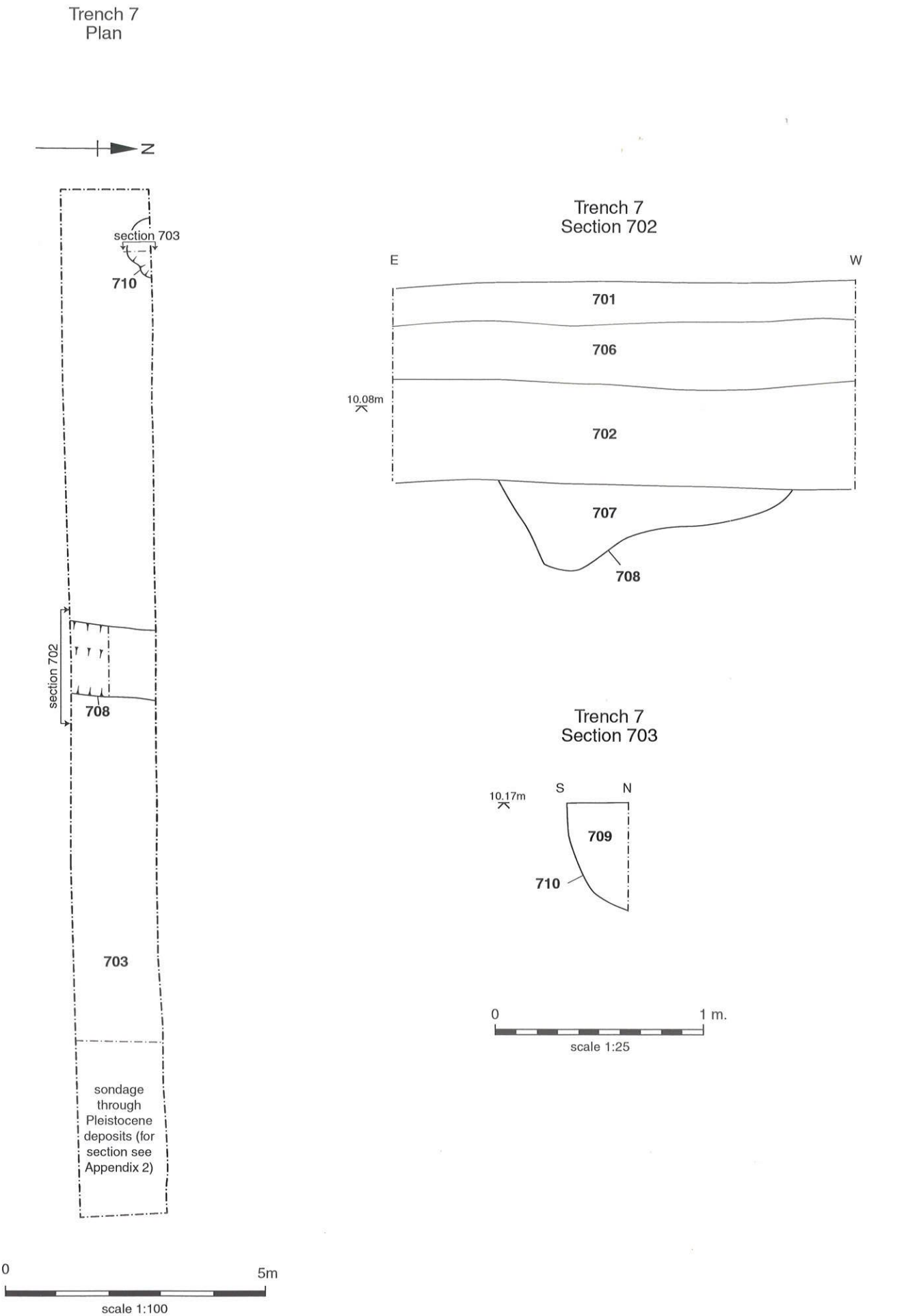


Figure 9: Trench 7, plan and section

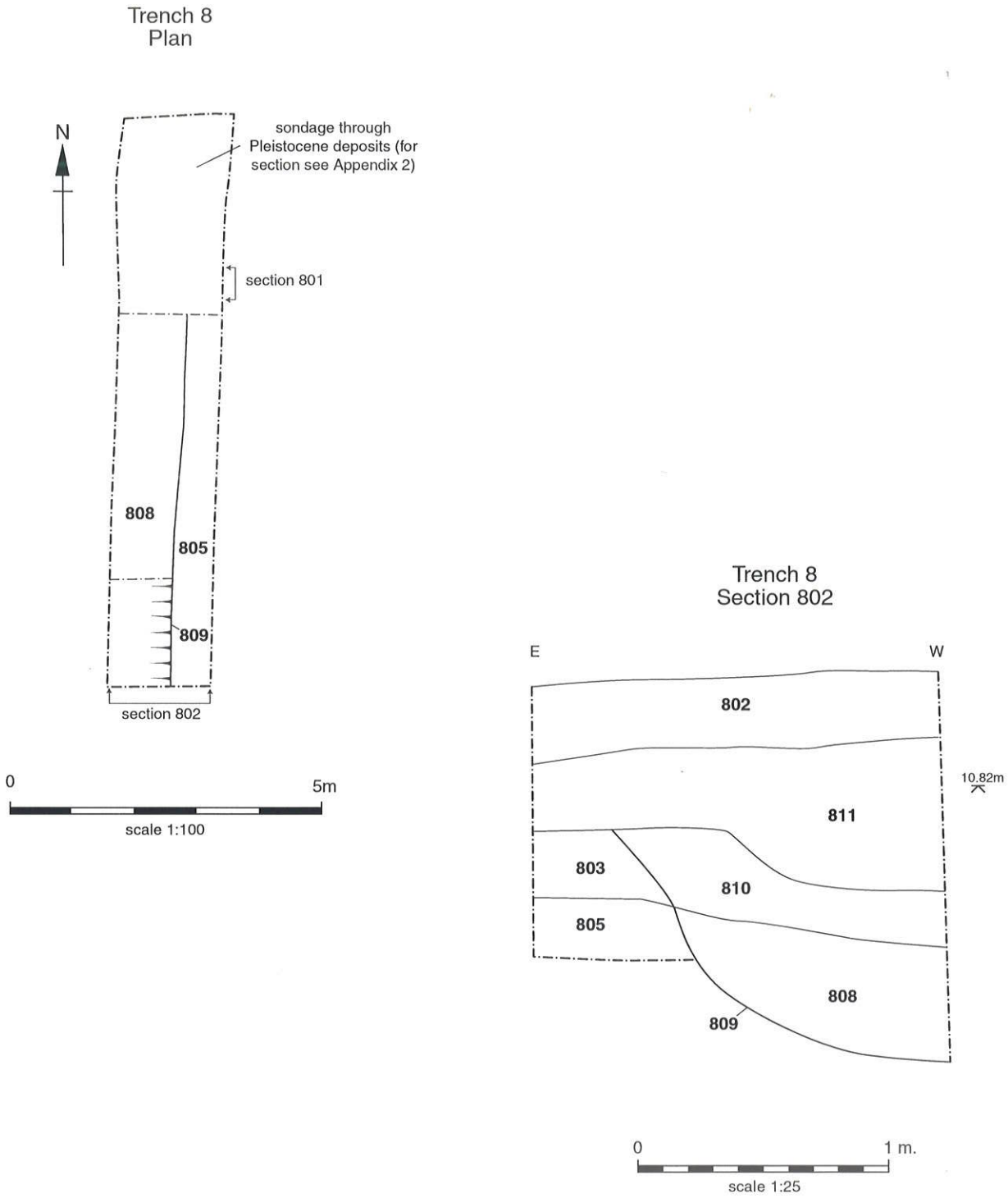


Figure 10: Trench 8, plan and section

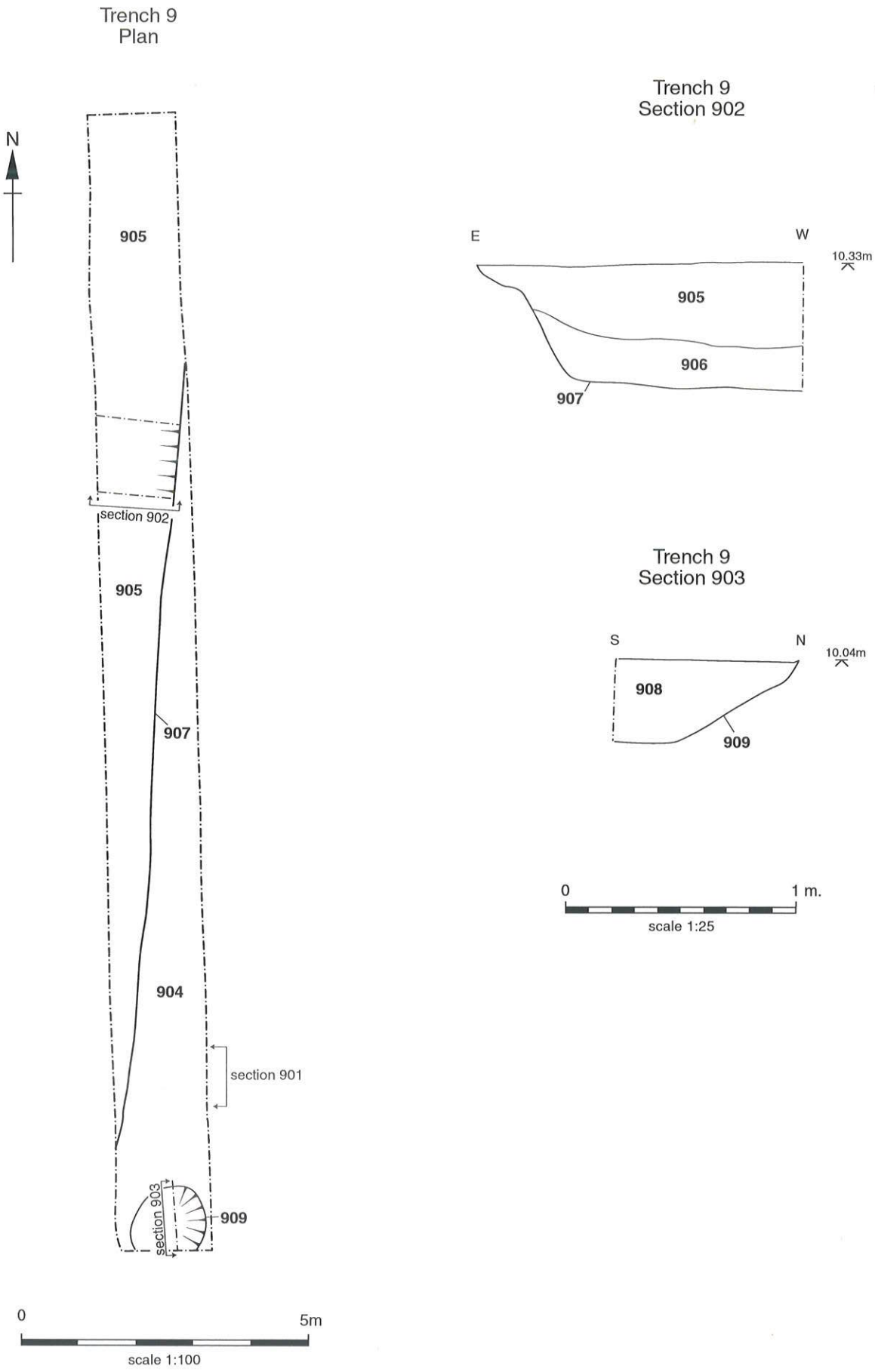
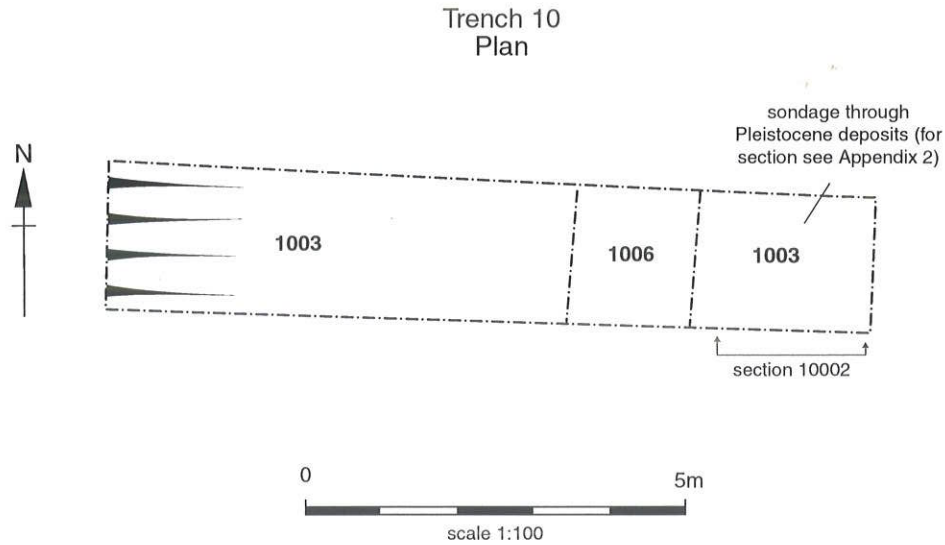


Figure 11: Trench 9, plan and sections



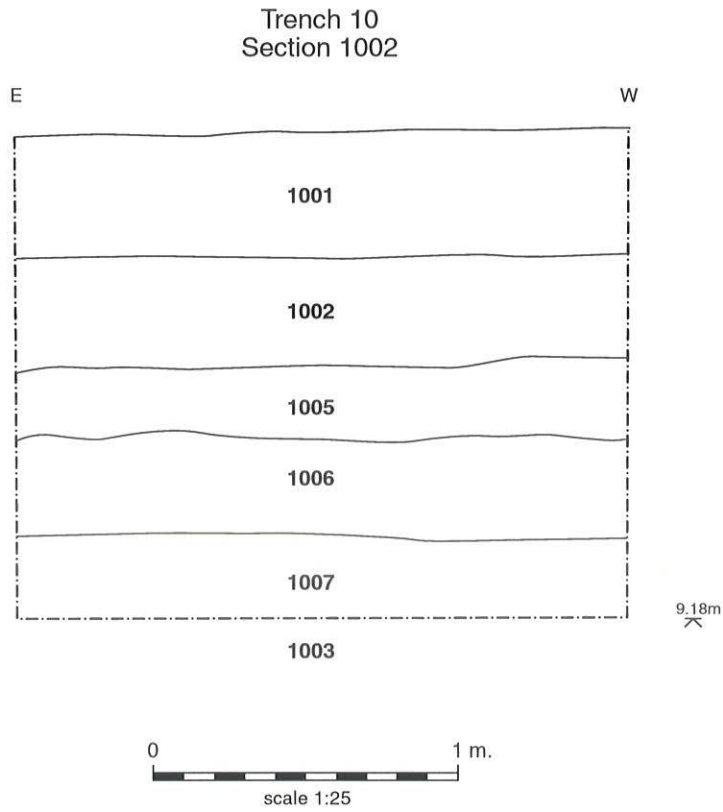


Figure 12: Trench 10, plan and section

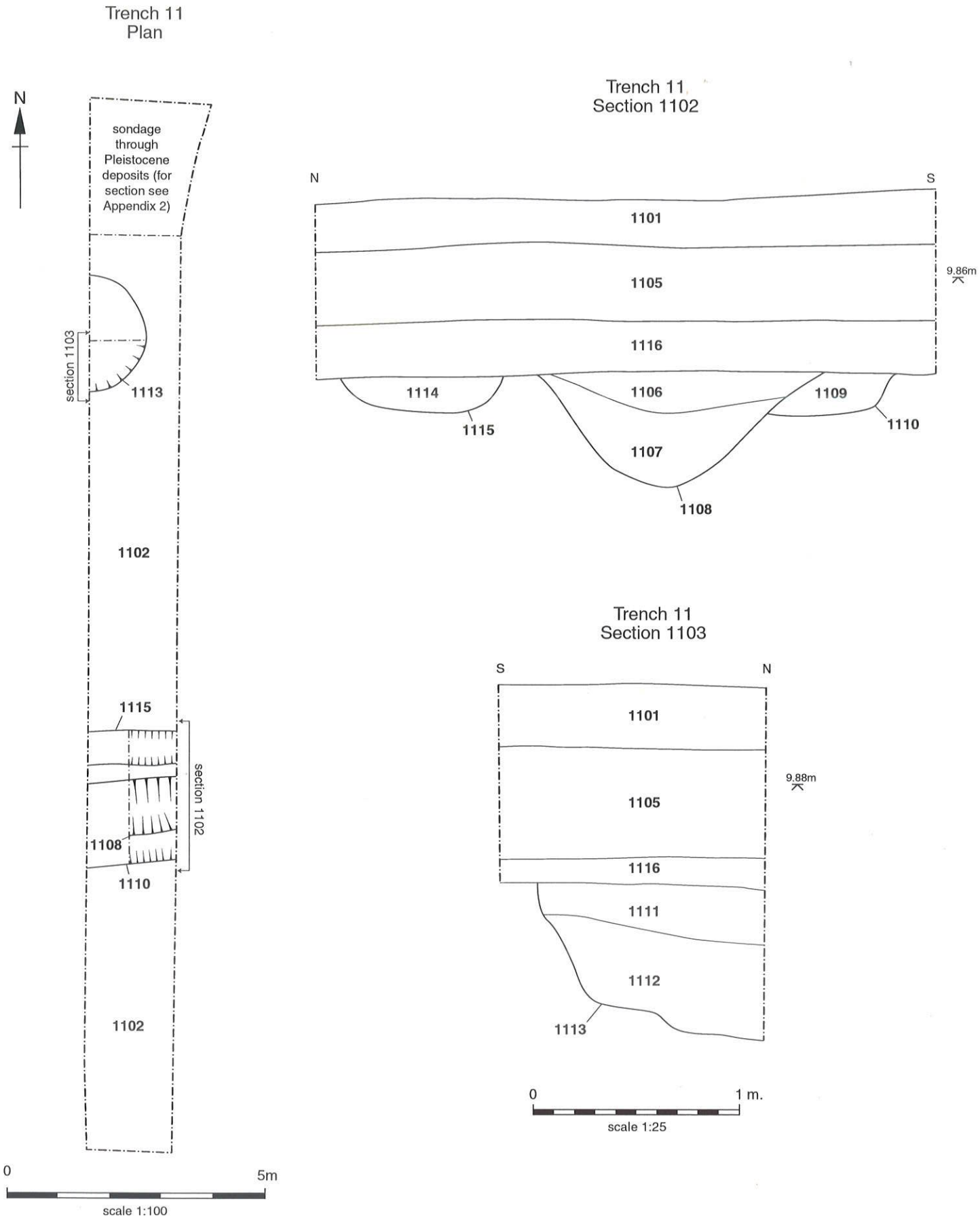


Figure 13: Trench 11, plan and sections

APPENDIX 2 EVALUATION OF PALAEOLITHIC POTENTIAL

POWDERMILL LANE, DARTFORD

FIELD EVALUATION REPORT (PALAEOLITHIC)

Dr Francis Wenban-Smith

Centre for the Archaeology of Human Origins
University of Southampton

CONTENTS

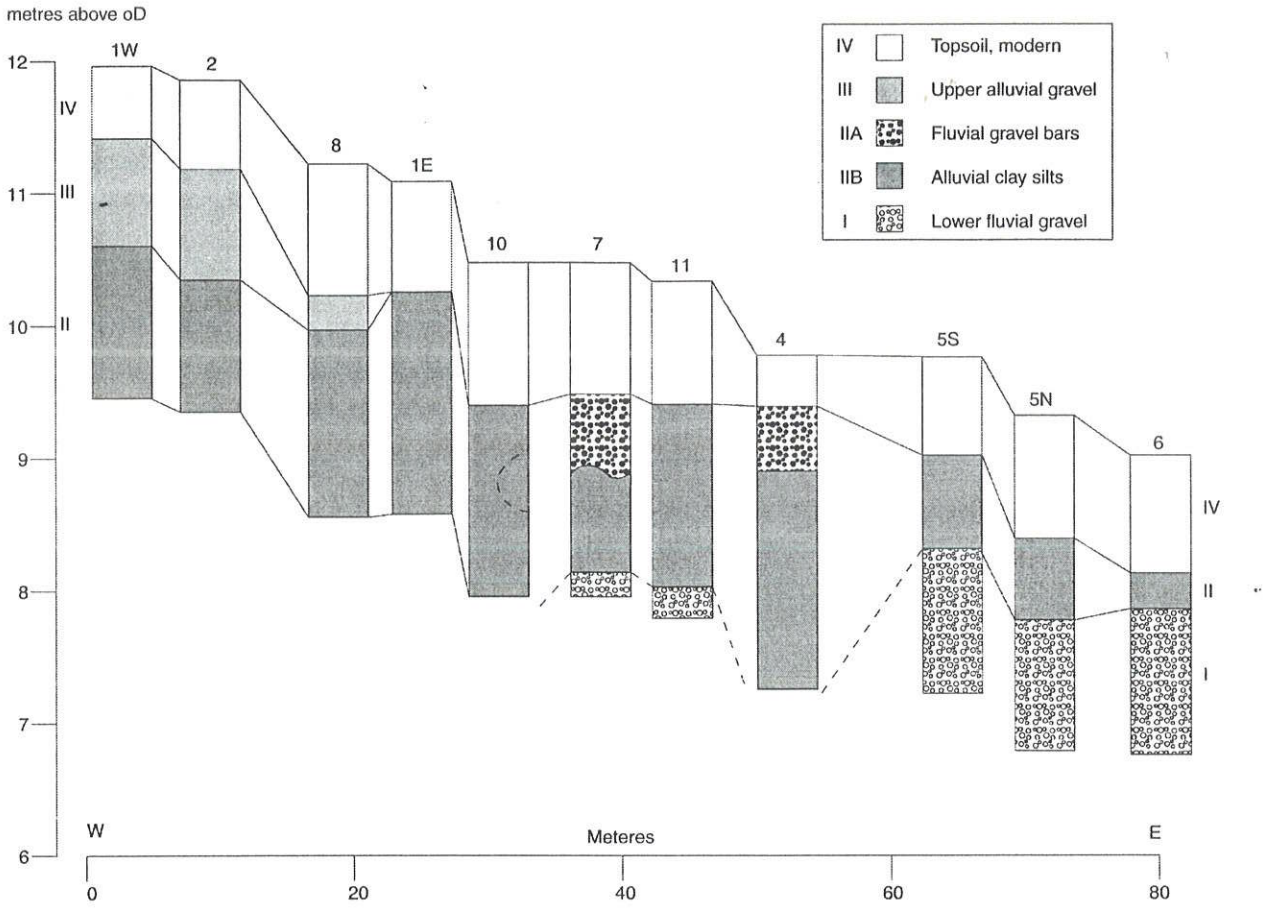


Fig. 1 Summary geological cross section

SUMMARY

Pleistocene fluvial deposits are present in all the trial pits. The base of the Pleistocene sequence was not reached in any of the trial pits, so its full depth, any deeper variations in sedimentary facies and the nature of the Tertiary bedrock remain unknown. The sequence appears to represent a single cycle of fluvial terrace formation with a fine-grained clay-silt unit, deposited during warmer interglacial conditions, sandwiched between two coarser gravel units, deposited during the end of the cold stages which preceded and succeeded the intervening interglacial. The Pleistocene units are broadly horizontal, and have been truncated by the modern ground surface which slopes down west to east across the evaluation area, towards the current Darenth.

A single flint flake was found within the fine-grained clay-silt. It constituted the broken distal end of a blade and was unpatinated and in fairly fresh condition.

The fine-grained clay-silt unit contained very sparse molluscan evidence concentrated in restricted horizons.

1 INTRODUCTION

1.1 This report concerns the results of a field evaluation for Palaeolithic archaeological evidence on land proposed for housing development by Bovis Homes west of the Darenth off Powdermill Lane, Dartford (main report, Figs 1 and 2). Two sites are proposed: Site A (TQ 542 728) south of Powdermill Lane and at the junction with Hawley Road, and Site B (TQ 543 730) north of Powdermill Lane adjoining Greenbanks and Brooklands Lake.

1.2 Site A has not been subject to previous development or quarrying. Geotechnical investigations (ENSR International 2000) have shown that Site A contains undisturbed Pleistocene sediments between 0.5m and 1.0m below the current ground surface. Site A was evaluated by excavation of 11 trial pits.

1.3 Geotechnical investigations (*ibid.*) have shown that Site B has been subject to previous quarrying, and contains modern made ground over most of its area to a depth of at least *c.* 3m and so was not subject to field evaluation at this stage.

1.4 The field evaluation of the Palaeolithic potential of Site A was carried out between 13 and 19 February by the Oxford Archaeological Unit under the supervision of Francis Wenban-Smith and Philip Rye as Palaeolithic specialists, and with Martin Bates attending on one day as a Quaternary geological specialist.

2 PALAEOLITHIC ARCHAEOLOGICAL BACKROUND

2.1 The evaluation area lies about 1km south of the Dartford town centre and immediately west of the River Darenth, at the junction of Hawley Road and Powdermill Lane (main report, Figs 1 and 2). The ground surface of the evaluation area slopes down west towards the Darenth, from *c.* 12.5-13m OD along its western side to *c.* 8.5m OD along its eastern side. The evaluation area is situated near the western fringe of a north-south trending Darenth terrace deposit mapped as Taplow Gravel by the most recent British Geological Survey mapping (BGS 1998) [equivalent to Mucking Gravel in Bridgland's (1994) re-assessment of the nomenclature and correlations of Lower Thames deposits]. The higher ground immediately to the west is also a Darenth terrace deposit, mapped as Lynch Hill Gravel [Corbets Tey Gravel for Lower Thames (Bridgland 1994)]. These north-south trending deposits incise into the higher east-west trending Thames deposits mapped as Boyn Hill Gravel [Orsett Heath Gravel for Lower Thames (Bridgland 1994)] *c.* 150m southeast of the western margin of the evaluation site.

2.2 No Palaeolithic archaeological material is known from the evaluation area itself. However over 30 handaxes (plus a few flakes), some in fresh condition indicating a lack of post-depositional disturbance, have been recovered from old gravel quarries (Smith's Pit, Brotherwood's Pit) exploiting the Lynch Hill/Corbets Tey Gravel on the higher ground the other side of Hawley Road from the evaluation area, in the area of Churchill Copse and Mitchell Close (Wessex Archaeology 1993). Detailed information on the stratigraphy in these quarries and the contexts of the archaeological material was not recorded. These deposits are mapped as continuing right up to the western boundary of the evaluation area, and it is likely that they are present in the higher ground along its western side.

2.3 Further to the north, at the mouth of the Darenth where it joins the main Thames *c.* 5km northeast of the evaluation area, the Taplow Gravel is overlain by a substantial spread of "brickearth" [sandy clay-silt], newly christened the "Crayford Silt" in the recent British Geological Survey mapping (BGS 1998). The Crayford brickearth reaches 7.5m thick at its western boundary, thinning and disappearing eastwards over a distance of almost 1km. It rests on the surface of the Taplow Gravel which slopes down eastward from *c.* 7.5m OD where the brickearth is thickest to *c.* 4m OD where the brickearth disappears. The Crayford brickearth is famous for having contained substantial spreads of undisturbed Palaeolithic knapping scatters in association with large faunal remains such as mammoth and woolly rhinoceros (Spurrell 1880; Chandler 1914 & 1916: Roe 1981). These were mostly found at the base of the brickearth, at its junction with the underlying Taplow Gravel, although archaeological material has also been recovered from horizons within the main body of the brickearth. The Crayford brickearth also contained prolific supplementary biological palaeo-environmental evidence such as small vertebrates and molluscs, making it a Palaeolithic archaeological resource of international significance. Although Crayford brickearths have not been mapped at the evaluation site, pockets overlying the Taplow Gravel may well be present, particularly towards its western fringe, and if so are likely to contain significant Palaeolithic archaeological evidence.

3 AIMS AND OBJECTIVES

3.1 The aims and objectives of the Palaeolithic field evaluation were laid down in the specification produced by the Heritage Conservation Group from the Strategic Planning Directorate of Kent County Council (KCC 2000). The aim of the Palaeolithic field evaluation was to assess the distribution, nature and Palaeolithic archaeological significance of these Pleistocene deposits in respect of:

3.2
- The potential presence of primary context archaeological material
- The presence and potential for analysis of any environmental/biological evidence in the sediments
- The horizontal and vertical extent and sedimentological character of Pleistocene deposits at the site
- The depositional and post-depositional history of any archaeological material as inferred from its condition and context
- The local, regional or national archaeological and geological importance of any Pleistocene sediments encountered and their potential to address current research objectives

4 METHODS

4.1 In order to assess the distribution and nature of the Pleistocene deposits in the evaluation area and their Palaeolithic archaeological significance eleven trial pits (1E, 1W, 2, 4, 5N, 5S, 6, 7, 8, 10 and 11) were excavated. The trial pits were evenly distributed across the evaluation area so

far as possible within the restrictions of i) avoiding proposed housing plots, and ii) being placed at the ends of the 10m or 20m trial trenches dug to evaluate for recent archaeological evidence, and given the same numbers (see Figs 3-13, main report).

4.2 Each trial pit was dug by mechanical excavator with a toothless ditching bucket and was *c.* 1.5m x 2.5m in plan and *c.* 2.5m deep. Sediment was removed in horizontal spits of *c.* 100mm thickness taking care not to cross stratigraphic boundaries. The depth of each spit and the sedimentary sequence revealed in each trial pit were recorded following standard descriptive practices. Once undisturbed Pleistocene deposits were reached, and if the sediments were suitable for sieving, a 100 litre sample from each 25cm depth of sediment was taken and sieved through a mesh of 1cm x 1cm for lithic artefacts and faunal remains. When sediments were not suitable for sieving, mechanical excavation continued in shallower spits of 50-100mm with a close watch kept for Palaeolithic evidence both in the freshly excavated spoil and in the base and sections of the trench as excavation progressed.

4.3 Each trial pit was entered after it had been excavated to a depth of *c.* 1.2m, a drawing made of one representative section at a scale of 1:20 and the sequence of deposits exposed given unique context numbers and described. Trial pits were then excavated to their full depth and the lower stratigraphy recorded without entering.

4.4 When fine-grained deposits potentially containing palaeo-environmental evidence such as molluscs and small vertebrates were exposed, samples of 10 litres were taken for off-site processing by wet-sieving through a graded nest of sieves of mesh-sizes 10mm, 4mm, 2mm, 1mm and 0.5mm. The dried residues were examined by the Palaeolithic specialist to see if any significant palaeo-environmental evidence was present.

5 RESULTS

Overview

Stratigraphy and interpretation

5.1 Pleistocene fluvial deposits are present in all the trial pits, underlying the topsoil and modern made ground which reaches to between 0.5m and 1m beneath the ground surface. The base of the Pleistocene sequence was not reached in any of the trial pits, so its full depth, any deeper variations in sedimentary facies and the nature of the Tertiary bedrock remain unknown. The deposits in each trial pit can be correlated with each other to model the overall sequence across the site (Fig. 1). The sequence appears to represent a single cycle of fluvial terrace formation, following Bridgland's model (1994), with a fine-grained clay-silt dominated unit, deposited during warmer interglacial conditions, sandwiched between two coarser gravel units, deposited during the onset of climatic amelioration at the end of the cold glacial stages which preceded and succeded the intervening interglacial. The Pleistocene units are broadly horizontal, and have been truncated by the modern ground surface which slopes down west to east across the evaluation area, towards the current Darenth.

5.2 Four main groups of deposits were recognised (Table 1).

Group	*Name*
IV	Topsoil, modern made ground
III	Upper fluvial gravel
II	Alluvial clay-silt and gravel
I	Lower fluvial gravel

Table 1: major groups of deposit in Palaeolithic trial pits

I Lower fluvial gravel

5.3 The lower fluvial gravel was present in most of the trial pits in the lower eastern half of the evaluation area (5S, 5N, 6, 7, 10 and 11). The deposit consists of a sub-horizontally bedded, moderately to poorly sorted, medium-coarse flint gravel in a medium-coarse, occasionally slightly silty, sand matrix. The top of the deposit is at *c.* 8m OD. Its base was not reached in any of the trial pits, and the gravel could extend several metres downwards. The local water table was also present at *c.* 7.5-8m OD, and the bases of trial pits dug to beneath this depth filled with water. This deposit is interpreted as having been laid down by fluvial action under fairly high energy aggradational conditions following the initial downcutting accompanying the climatic amelioration at the end of a cold stage.

II Alluvial clay-silt and gravel

5.4 These deposits were present in all of the trial pits. The trial pits were sufficiently close, and the sedimentary characteristics sufficiently similar to be confident that these deposits are directly equivalent, and not divided by a geological unconformity. These deposits were divided into two facies: IIA and IIB. Facies IIA, which was generally stratigraphically lower, consists of moderately to well compacted slightly sandy clay-silts with variable proportions of fine-medium sand and occasional fine gravel clasts. Occasional horizons of calcareous sedimentary concretions were present. The deposits of this facies form an abrupt contact with the underlying gravel at *c.* 8m OD in the lower trial pits where the lower gravel was present; otherwise this was the lowermost deposit. This fine-grained facies reached a maximum thickness of almost 1.5m in trial pits 1E and 4, and a maximum height of 10.5m in trial pit 1W. This facies is interpreted as floodplain alluvium, deposited during periodic overbank flooding during a period of climatic warmth.

5.5 Facies IIB, which was stratigraphically higher, was present in trial pits in the central part of the site (4, 7 and 10). It consists of moderately to well compacted sandy clay-silts with a higher gravel content, and occasionally medium to very coarse gravel clasts. The deposits of this facies form a diffuse and irregular contact with those of the underlying finer-grained facies IIA, and this junction occurs between *c.* 8.5m and 9.0m OD, their upper surface being truncated at *c.* 9.5m OD by modern activity. This facies is interpreted as gravel bars formed by short-lived streams migrating across the floodplain environment during the same period of climatic warmth during which the main body of facies IIA was deposited. A possible alternative interpretation is that facies IIB represents a colluvial or solifluction deposit, in which gravel clasts from higher deposits have become mobilised downslope, and have become mixed with the upper part of the underlying fine-grained facies IIA.

III Upper fluvial gravel

5.6 The upper fluvial gravel was only present in the trial pits in the highest part of the evaluation area along its western side (1W, 2 and 8). It consists of a poorly sorted, sub-horizontally bedded, moderate to very coarse flint gravel with some larger cobbles, with clasts varying in condition from sub-angular to well-rounded. The matrix, where present, is a clay-silty sand, although the gravel is clast supported in trial pit 1W. Its surface lies at *c.* 11.5m OD and its base lies at *c.* 10.5m OD, with an abrupt boundary with the underlying alluvial clay-silt. This gravel is interpreted as having been laid down by fluvial action under fairly high energy aggradational conditions at the onset of climatic amelioration at the end of a cold stage, preceding downcutting and further aggradation at a lower level.

IV Topsoil, modern made ground

5.7 Topsoil is present in all the trial pits, although truncated and disturbed by recent ground clearance with heavy plant which had left a deeply rutted and muddy ground surface over the extent of the site. The topsoil is generally a dark greyish brown sandy clay-silt with varying

proportions of flint pebbles and moderate to frequent root presence. It is underlain in all the trial pits by varying thickness of made ground, generally a variably compacted sandy clay silt with some flint pebbles and occasional fragments of modern ceramic building materials (cbm) such as tile, brick and pipeline.

Palaeolithic archaeological evidence

5.8 In total 4,100 litres (41 samples) of Pleistocene fluvial sediment were sieved for artefacts and larger faunal remains through a 1cm mesh on-site, with between 700 and 1,500 litres sieved for each of the main depositional groups identified (Table 2). Fifteen samples (150 litres), mostly from the fine-grained deposits of group IIA, but including single samples from deposits of groups I and IIB were processed by wet-sieving through a 0.5mm mesh off-site for smaller biological palaeo-environmental evidence (Table 2).

Group	*100 litre spit samples*	*10 litre environmental samples*
III	1,200	None
IIA	1,500	130
IIB	700	10
I	700	10

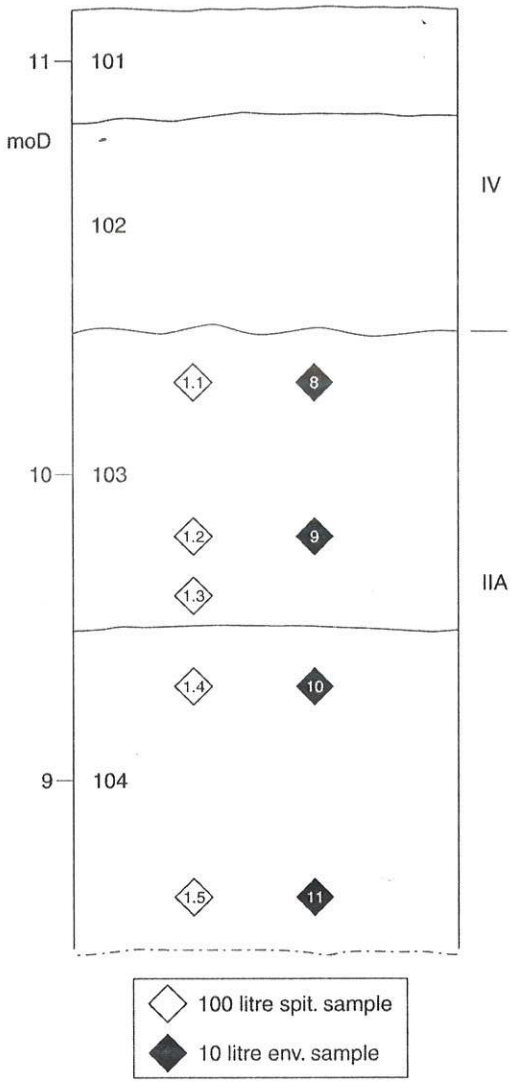
Table 2: total volumes (litres) of sediment processed for each depositional group

5.9 A flint waste flake was recovered from the group II deposits in trial pit 10 (context 1003, sample 10.2), at the junction between more gravelly deposits relating to a facies IIB depositional environment and the finer-grained group IIA facies. The flake was the broken distal end of a fairly broad and thin blade, and was in generally fresh condition, although the sharp edges were slightly abraded. No other artefacts or larger faunal remains were found.

5.10 Molluscs were present in the group IIA deposits in trial pits 1E (samples 10 and 11), 2 (sample 6) and 8 (sample 1). The molluscan evidence was very fragmentary, and whole specimens are very scarce, one being noted on site in trial pit 8 at the horizon of sample 1, and one being present in sample 10 from trial pit 1E. The molluscan evidence seems to be concentrated in narrow bands within the group IIA clay-silts in the higher western half of the evaluation area. No other biological palaeo-environmental evidence, such as plant macro-fossils or small vertebrates was found — occasional pieces of woody material found quite deep within the group IIA sediments in trial pit 8 were interpreted as intrusive modern roots, the sieved residues of the environmental samples having been quite full of small rootlets.

TRIAL PIT 1 (E)

Sedimentary sequence and interpreted depositional environment



Context	*Description*	*Interpretation*
101	Loose to mod. compacted, dark grey LOAM, occ. flint pebbles and freq. roots	Topsoil
102	Mod. compacted, greyish brown LOAM, freq. roots, occ. cbm	Made ground
103	Mod. compacted to firm, mottled dark gray/orange-brown sandy CLAY-SILT with occ. fine flint pebbles	Alluvial floodplain
104	Mod. compacted to firm, mottled orange/grey CLAY-SILT with calcareous concretions decreasing downward	Floodplain alluvium

Fig. 2 Trench 1 (east): section through geology

Palaeolithic archaeological evidence

5.11 No larger artefactual or faunal evidence was recovered by on-site sieving.

Context	*Sample*	*Volume l*	*Finds*
103	1.1	100	None
	1.2	100	None
	1.3	100	None
104	1.4	100	None
	1.5	100	None

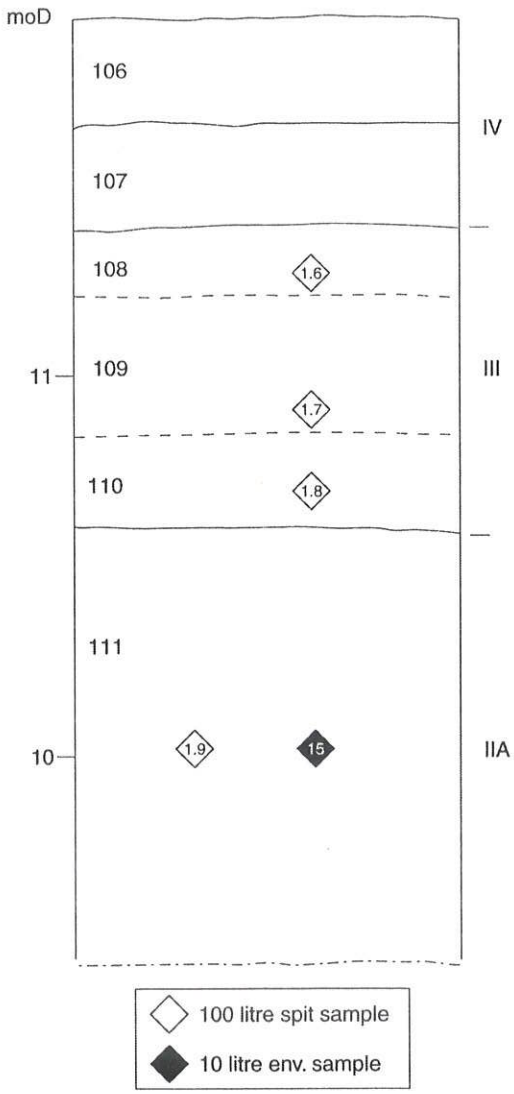
Environmental evidence

5.12 Scarce molluscan remains, generally fragmentary, were present in context 104, samples 10 and 11.

Context	*Sample*	*Volume l*	*Finds*
103	8	10	None
-	9	10	None
104	10	10	Occasional molluscs and frag's
	11	10	Occasional mollusc frag's

TRIAL PIT 1 (W)

Sedimentary sequence and interpreted depositional environment



Context	*Description*	*Interpretation*
106	Loose to mod. compacted, dark greyish brown LOAM, occ. flint pebbles and freq. roots	Topsoil
107	Loose, reddish brown sandy SILT with occ. cbm	Made ground
108	Loose, matrix-supported and mod. sorted, greyish brown med.-coarse sandy flint GRAVEL	Fluvial channel aggradation
109	Very loose, clast-supported and poorly sorted, fine-v. coarse flint GRAVEL with occ. cobbles	Fluvial channel aggradation
110	Mod. loose, matrix supported and poorly sorted, reddish brown sandy flint GRAVEL	Fluvial channel aggradation
111	Mod. compacted, structureless, yellowish brown sandy CLAY-SILT; band of calcareous concretions c. 2m below g-surface	Floodplain alluvium

Fig. 3 Trench 1 (west): section through geology

Palaeolithic archaeological evidence

5.13 No larger artefactual or faunal evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
108	1.6	100	None
109	1.7	100	None
110	1.8	100	None
111	1.9	100	None

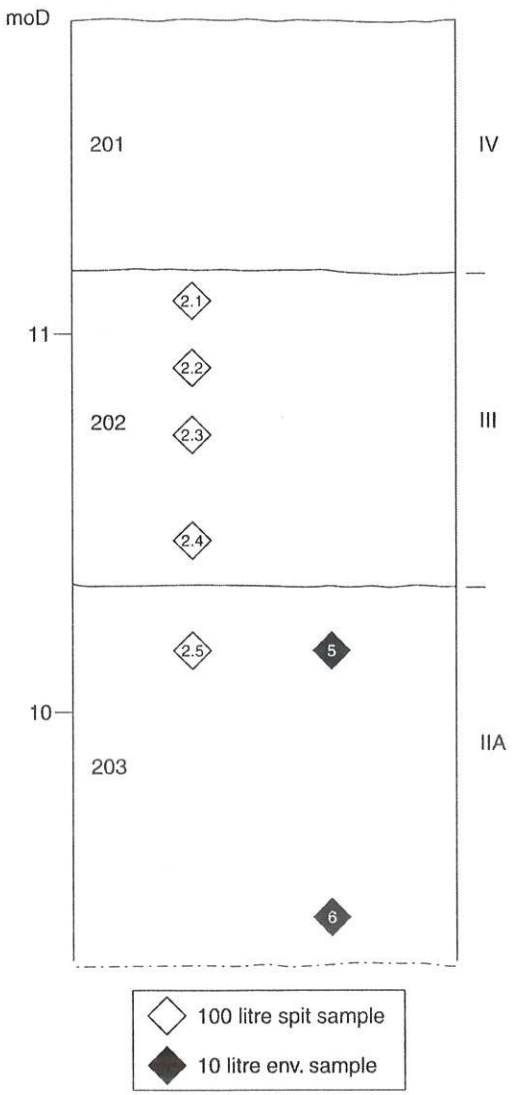
Environmental evidence

5.14 No environmental evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
111	15	10	None

TRIAL PIT 2

Sedimentary sequence and interpreted depositional environment



Context	*Description*	*Interpretation*
201	Mod. loose, dark grayish-brown LOAM with roots and cbm	Topsoil
202	Mod. compacted to firm, matrix supported and moderately sorted, GRAVEL in orange-brown clay-silty sand matrix	Fluvial channel aggradation
203	Mod. compacted to firm, structureless orange-brown CLAY-SILT with occ. sub-angular fine flint pebbles	Floodplain alluvium

Fig. 3 Trench 2: section through geology

Palaeolithic archaeological evidence

5.15 No larger artefactual or faunal evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
202	2.1	100	None
	2.2	100	None
	2.3	100	None
	2.4	100	None
203	2.5	100	None

Environmental evidence

5.16 A few fragments of mollusc shell were present in context 203, sample 6.

Context	*Sample*	*Volume l*	*Finds*
203	5	10	None
	6	10	Occasional mollusc fragments

TRIAL PIT 4

Sedimentary sequence and interpreted depositional environment

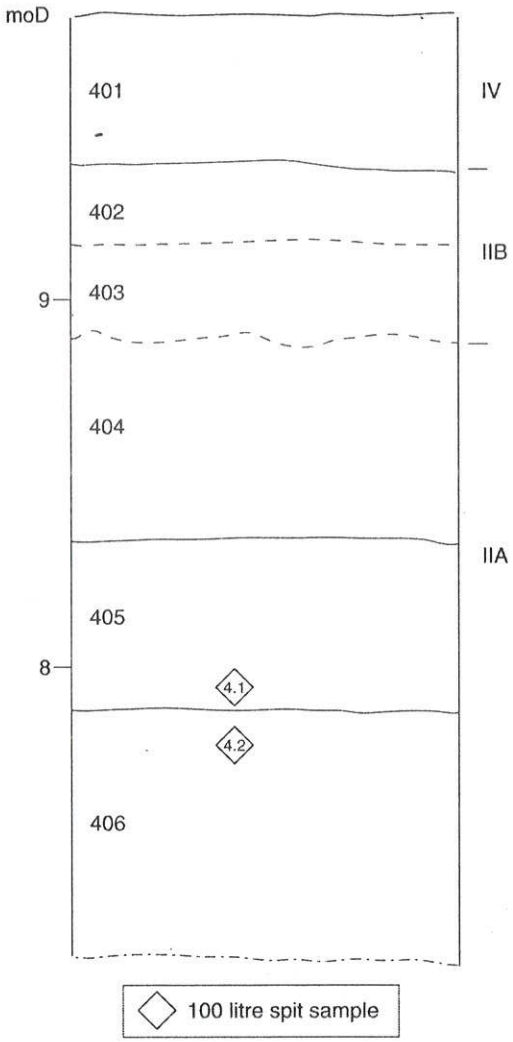


Fig. 4 Trench 4: section through geology

Context	*Description*	*Interpretation*
401	Mod. loose, dark grayish brown LOAM with freq. flint pebbles, roots, glass and cbm	Topsoil
402	Mod. compacted to loose, brown, sandy (m-f) LOAM/CLAY-SILT with flint pebbles and occ. roots	Floodplain alluvium, gravel bar
403	Mod. compacted, mottled brown/grey clayey LOAM containing flint pebbles	Floodplain alluvium, gravel bar
404	Mod. compacted to firm, mottled orange brown/light grey sandy (f) CLAY-SILT; contains occ. paler lenses sand and fine gravel	Floodplain alluvium
405	Mod. compacted to firm, structureless, slightly clayey, mottled orange-brown/light grey coarse SAND with freq. sub-angular to mod. rounded fine-coarse flint pebbles	Floodplain alluvium
406	Mod. compacted to firm, fine silty SAND/sandy (f) SILT with occ. flint nodules 10-30cm; gen. colour mottled orange/brownish yellow	Floodplain alluvium

Palaeolithic archaeological evidence

5.17 No larger artefactual or faunal evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
405	4.1	100	None
406	4.2	100	None

Environmental evidence

5.18 No samples were taken for environmental evidence.

TRIAL PIT 5 (S)

Sedimentary sequence and interpreted depositional environment

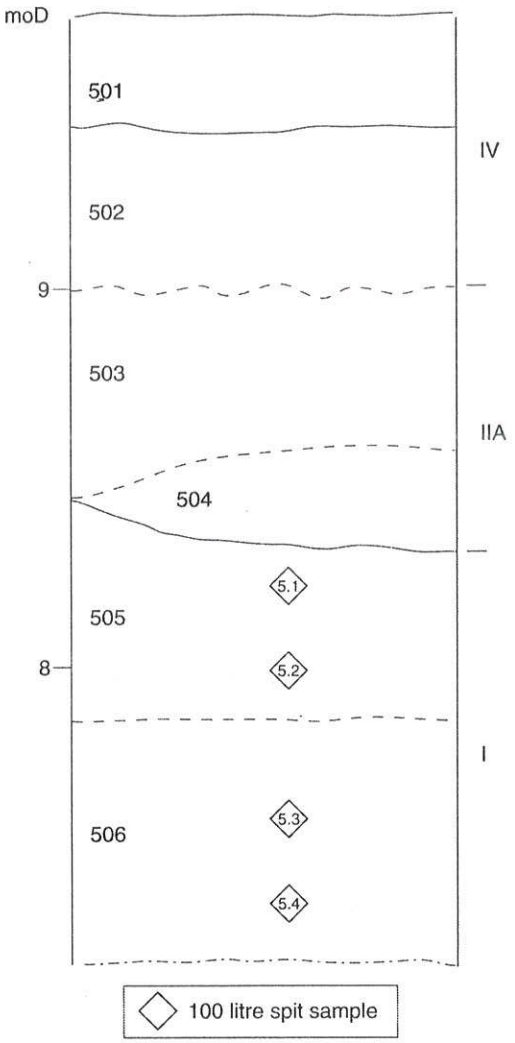


Fig. 5 Trench 5 (south): section through geology

Context	*Description*	*Interpretation*
501	Dark grayish brown LOAM; loose to mod. compacted with frq. roots, cbm and flint pebbles	Topsoil
502	Brown LOAM; mod. compacted, contains roots, cbm and flint pebbles	
503	Mottled orange-brown/grey sandy CLAY-SILT; firm and structureless, contains freq. sub-angular f-fractured flint pebbles and cobbles	Floodplain alluvium, gravel bar
504	Mottled orange-brown/grey CLAY-SILT; stiff and structureless	Floodplain alluvium
505	Mod.sorted coarse, matrix supported (sticky, gray, clay-silty) flint GRAVEL; pebbles gen. sub-angular, occ. rounded, matrix sandier towards base	Fluvial channel aggradation
506	Strong brown coarse SANDS and sandy GRAVEL, loose to mod. compacted, pebbles gen. mod. rounded, horizontally stratified with concreted horizons and bands of v. dark Mn staining; saturated with groundwater	Fluvial channel aggradation

Palaeolithic archaeological evidence

5.19 No larger artefactual or faunal evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
505	5.1	100	None
	5.2	100	None
506	5.3	100	None
	5.4	100	None

Environmental evidence

5.20 No samples were taken for environmental evidence.

TRIAL PIT 5 (N)

Sedimentary sequence and interpreted depositional environment

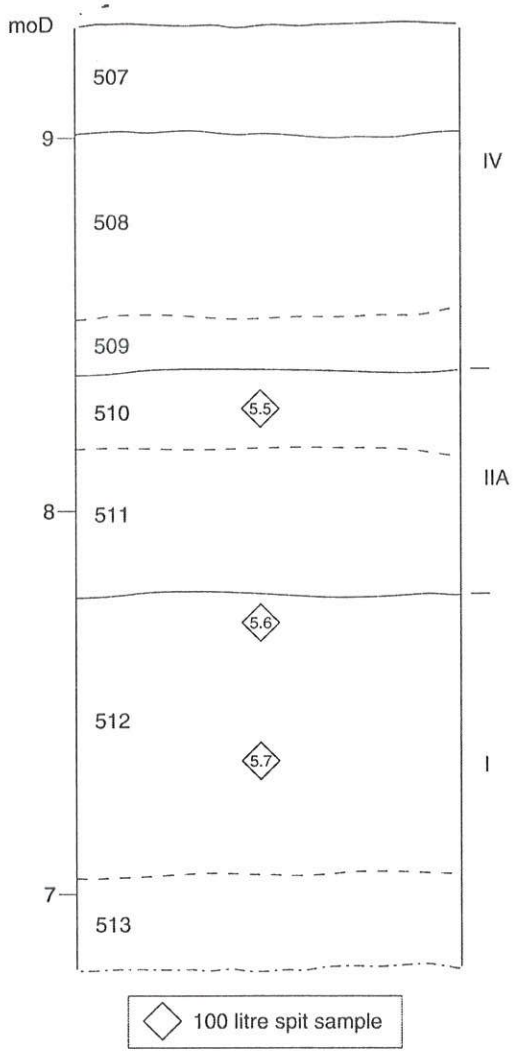


Fig. 6 Trench 5 (north): section through geology

Context	*Description*	*Interpretation*
507	Dark grayish brown silty LOAM containing occ. flint pebbles, roots and cbm	Topsoil
508	Dark reddish brown/strong brown sandy CLAY-SILT with occ. flint pebbles and cbm	Modern, made ground
509	Dark grayish brown sandy CLAY-SILT with occ. flint pebbles, charcoal frag's and cbm	Modern, made ground
510	Soft and pliable, structureless and massive, pale olive/grey sandy (f) CLAY-SILT with occ. v. coarse sub-angular flint pebbles at upper surface	Floodplain alluvium
511	Mod. compacted, structureless/massive, slightly sandy CLAY-SILT, mottled pale olive-grey/reddish brown with occ. medium to v. coarse sub-angular flint pebbles	Floodplain alluvium
512	Moderately-poorly sorted, structureless, matrix supported, m-c flint GRAVEL in yellowish-brown, silty sandy matrix	Fluvial channel aggradation
513	Bedded (southward dipping?), poorly sorted m-c flint GRAVEL in coarse orange-brown sandy matrix	Fluvial channel aggradation

Palaeolithic archaeological evidence

5.21 No larger artefactual or faunal evidence was recovered.

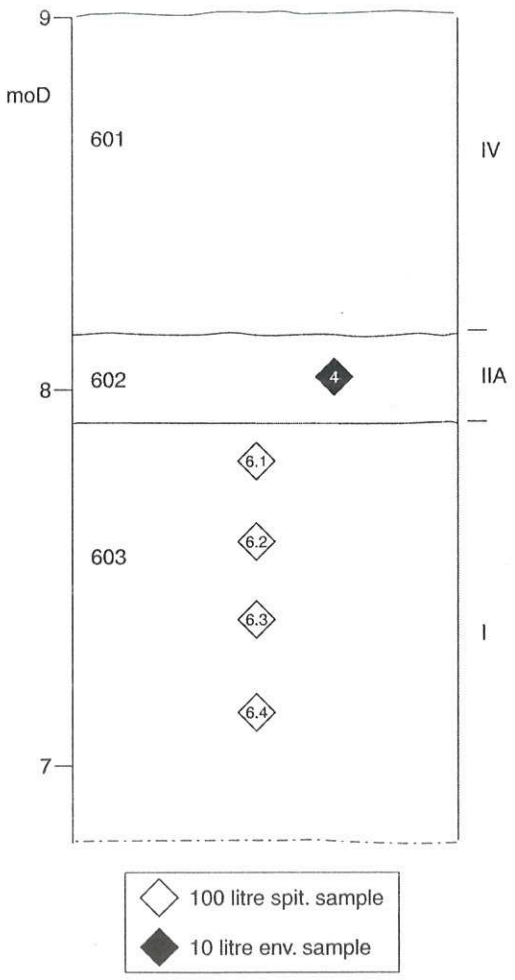
Context	*Sample*	*Volume l*	*Finds*
510	5.5	100	None
512	5.6	100	None
-	5.7	100	None

Environmental evidence

5.22 No samples were taken for environmental evidence.

TRIAL PIT 6

Sedimentary sequence and interpreted depositional environment



Context	*Description*	*Interpretation*
601	Dark grayish brown LOAM with cbm and roots	Topsoil
602	Mod. compacted to firm, clayey fine SAND, orange-brown, with occ. rounded fine-medium flint pebbles	Floodplain alluvium
603	Loose, poorly sorted, structureless coarse flint GRAVEL (clasts sub-angular to mod. rounded), with matrix of yellowish brown sandy clay-silt; water table at *c.* 8m OD	Fluvial channel aggradation

Fig. 7 Trench 6: section through geology

Palaeolithic archaeological evidence

5.23 No larger artefactual or faunal evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
603	6.1	100	None
	6.2	100	None
-	6.3	100	None
	6.4	100	None

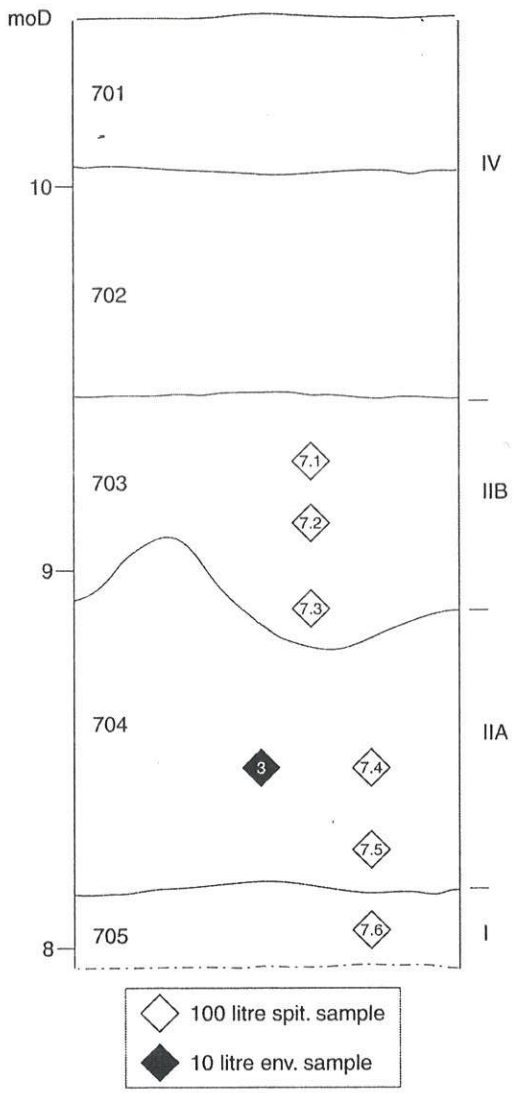
Environmental evidence

5.24 No environmental evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
602	4	10	None

TRIAL PIT 7

Sedimentary sequence and interpreted depositional environment



Context	*Description*	*Interpretation*
701	Loose, dark grayish brown LOAM with roots and cbm	Topsoil
702	Mod. compacted sandy LOAM with occ. mod. rounded flint pebbles and cbm	Modern, made ground
703	Mod. compacted to firm, matrix-supported, mod. sorted f-m flint GRAVEL (sub-angular to rounded) in yellowish brown (mottled strong brown) silty sand matrix	Alluvial floodplain, gravel bar
704	Mod. compacted to firm, yellowish brown (mottled orange/grey) clay-silty SAND with occ. m-c flint pebbles (mod. to well-rounded); sandier towards base with coarser flint pebbles and horiz. pale brownish and yellowish bands	Alluvial floodplain
705	Mod. loose, mod. sorted, medium-v. coarse flint GRAVEL (mod. to well-rounded) in slightly silty yellowish brown sand matrix; occ. small flint cobbles and flint nodules 15-20cm size	Fluvial channel aggradation

Fig. 9 Trench 7: section through geology

Palaeolithic archaeological evidence

5.25 No larger artefactual or faunal evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
703	7.1	100	None
	7.2	100	None
	7.3	100	None
704	7.4	100	None
	7.5	100	None
705	7.6	100	None

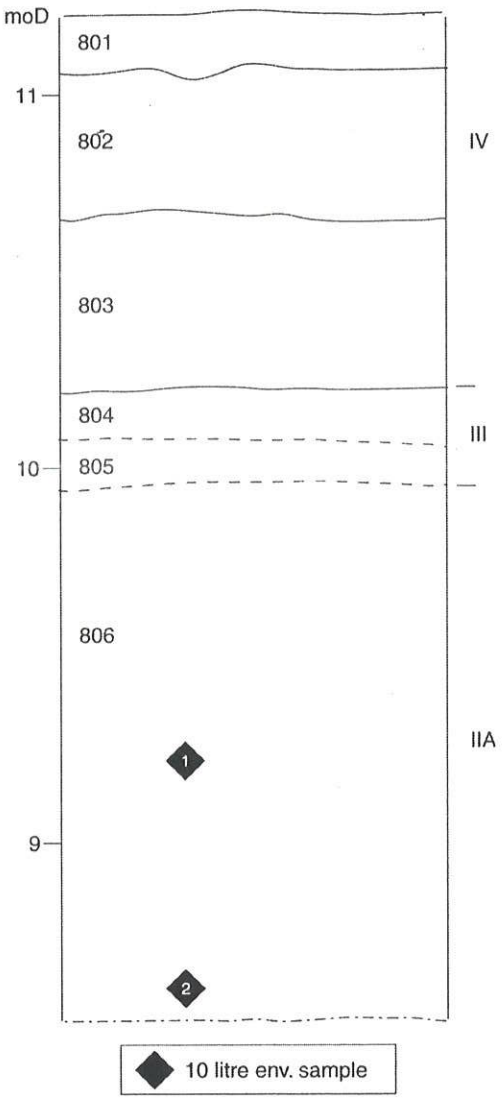
Environmental evidence

5.26 No environmental evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
704	3	10	None

TRIAL PIT 8

Sedimentary sequence and interpreted depositional environment



Context	*Description*	*Interpretation*
801	Loose, dark grayish brown silty LOAM with roots and cbm	Topsoil
802	Loose, dark yellowish brown stony and silty LOAM	Modern made ground
803	Mod. compacted, yellowish brown sandy LOAM with occ. fine-medium flint pebbles	Modern made ground
804	Soft, structureless, grayish brown SAND with mod. frequent fine-coarse flint pebbles	Fluvial channel aggradation
805	Mod. consolidated, matrix supported fine-medium sandy flint GRAVEL; gen. colour yellowish brown	Fluvial channel aggradation
806	Firm, olive yellowish brown clay-silty fine-medium SAND with clay-silty lenses towards top; increasingly pale and sandy downward	Floodplain alluvium
807	Mod. consolidated, mottled pale brown and light yellowish brown, slightly silty fine-medium SAND	Floodplain alluvium

Fig. 10 Trench 8: section through geology

Palaeolithic archaeological evidence

5.27 No suitable deposits for sieving were present, and no larger artefactual or faunal evidence was recovered during machine excavation.

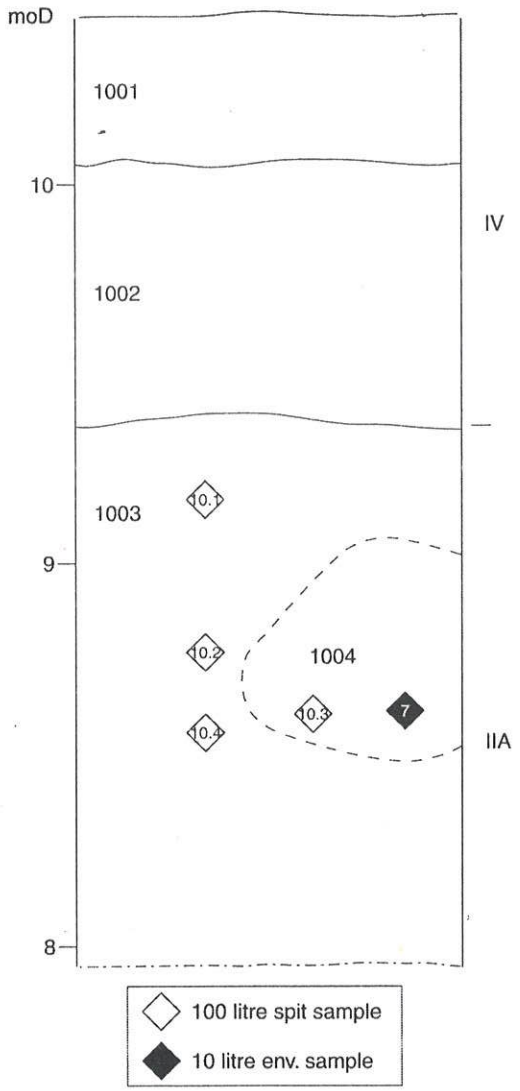
Environmental evidence

5.28 A few fragments of mollusc shell were present in context 806, sample 1.

Context	*Sample*	*Volume l*	*Finds*
806	1	10	Occasional mollusc fragments
807	2	10	None

TRIAL PIT 10

Sedimentary sequence and interpreted depositional environment



Context	*Description*	*Interpretation*
1001	Soft and loose, dark grayish brown silty LOAM with roots and cbm	Topsoil
1002	Mod. compacted dark grayish brown LOAM with flint pebbles, roots and cbm	Modern, made ground
1003	Mod. firm, structureless, mottled gray and orange-brown, clay-silty SAND/sandy CLAY-SILT with freq. flint pebbles and cobbles; becomes increasingly clayey downward	Floodplain alluvium, gravel bar
1004	Very firm, structureless, mottled orange/grey sandy CLAY-SILT with occasional fine-coarse flint pebbles	Floodplain alluvium

Fig. 11 Trench 10: section through geology

Palaeolithic archaeological evidence

5.29 The broken distal end of an unpatinated waste flake was found in context 1003, sample 10.2. The artefact came from a laminar reduction sequence, and was in generally fresh condition, although the sharp edges were slightly abraded.

Context	*Sample*	*Volume l*	*Finds*
1003	10.1	100	None
	10.2	100	Flint blade
	10.4	100	None
1004	10.3	100	None

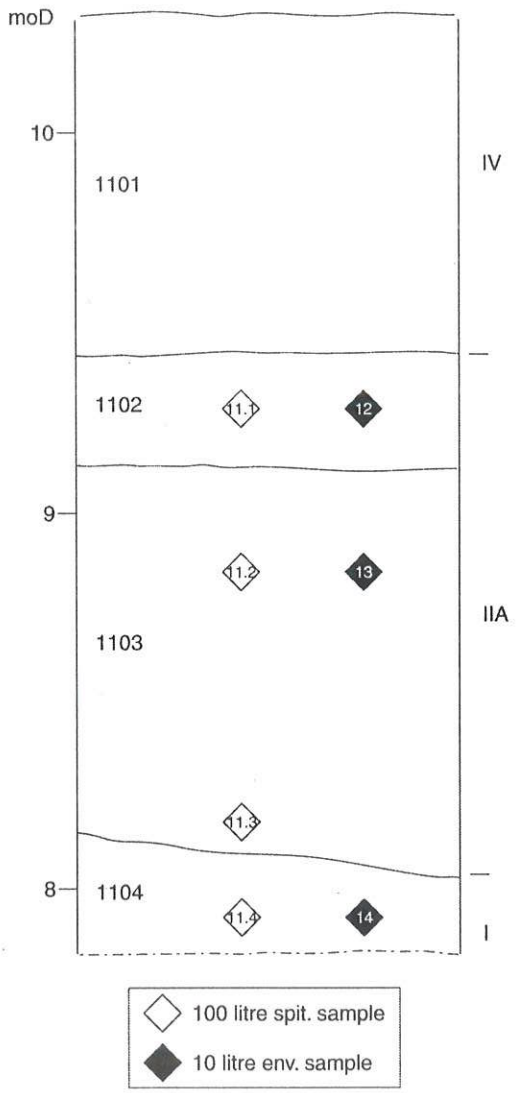
Environmental evidence

5.30 No environmental evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
1004	7	10	None

TRIAL PIT 11

Sedimentary sequence and interpreted depositional environment



Context	*Description*	*Interpretation*
1101	Mod. loose, greyish brown LOAM with flint pebbles, cbm and roots	Topsoil
1102	Mod. compacted, mottled orange/grey/dark brown clay-silty medium-fine SAND with occ. sub-angular to rounded flint pebbles	Floodplain alluvium
1103	Well compacted, structureless, mottled orange/pale grey sandy (f) CLAY-SILT	Floodplain alluvium; pale (Chalk?) flecks towards base
1104	Mod. compacted, structureless, mottled orange-brown/grey clay-silty SAND with freq. flint pebbles and cobbles	Fluvial channel aggradation

Fig. 12 Trench 11: section through geology

Palaeolithic archaeological evidence

5.31 No larger artefactual or faunal evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
1102	11.1	100	None
1103	11.2	100	None
	11.3	100	None
1104	11.4	100	None

Environmental evidence

5.32 No environmental evidence was recovered.

Context	*Sample*	*Volume l*	*Finds*
1102	12	10	None
1103	13	10	None
1104	14	10	None

6 DISCUSSION AND CONCLUSIONS

Summary

6.1 Pleistocene fluvial deposits are present in all the trial pits. The base of the Pleistocene sequence was not reached in any of the trial pits, so its full depth, any deeper variations in sedimentary facies and the nature of the Tertiary bedrock remain unknown. The sequence appears to represent a single cycle of fluvial terrace formation with a fine-grained clay-silt unit, deposited during warmer interglacial conditions, sandwiched between two coarser gravel units, deposited during the end of the cold stages which preceded and succeded the intervening interglacial. The Pleistocene units are broadly horizontal, and have been truncated by the modern ground surface which slopes down west to east across the evaluation area, towards the current Darenth.

6.2 A single flint flake was found within the fine-grained clay-silt. It constituted the broken distal end of a blade and was unpatinated and in fairly fresh condition.

6.3 The fine-grained clay-silt also contained very sparse molluscan evidence concentrated in restricted horizons.

Consideration and confidence rating of methodology

6.4 The methodology was highly appropriate for investigation of the presence, nature and Palaeolithic archaeological significance of Pleistocene deposits at the site. The quantity of Palaeolithic trial pits dug was sufficient to build a complete picture of Pleistocene deposits across the site, at least to the depth investigated, and to relate the main Pleistocene units to each other stratigraphically.

Potential for encountering undisturbed Palaeolithic evidence

6.5 Given the demonstrated presence of archaeological material in the fine-grained clay-silt which is present across the whole evaluation area (sedimentary group II), and its likely equivalence to the Crayford brickearths, there is a moderate-high chance of encountering undisturbed Palaeolithic evidence within it or at its base. The location of highest potential is probably between the depths of *c.* 8m and 9m OD at the western side of side, nearer the bank of the ancient channel. There is a very low chance of encountering such evidence in any of the other deposits.

Presence and potential for analysis of environmental/biological evidence

6.6 Molluscan evidence was demonstrated to be present in the fine-grained clay-silt deposit (group IIA). This evidence was, however, scarce and generally fragmentary. It is possible that isolated horizons with richer presence of molluscan remains in better condition are present in certain

locations. The presence of molluscan remains indicates the calcareous nature of the sediments, and demonstrates that small vertebrate evidence may also be present, although none has been found in the samples examined to date. The fact that none was found in the 130 litres processed from the fine-grained clay-silt suggests that any such evidence, if present, is also scarce. Ostracods may also be present in small quantities, but other forms of evidence such as pollen and insect remains are not likely to be present, given the preservational conditions of the sediment. No plant macro-fossils were present in the samples processed.

6.7 Molluscan and small vertebrate evidence would be of high potential for analysis, if even moderately rich horizons were found. Their analysis can help in the reconstruction of environmental and climatic conditions during formation of the sedimentary sequence, and in dating.

Horizontal and vertical extent and sedimentological character of deposits

6.8 Pleistocene fluvial deposits extend across the evaluation area, underlying the topsoil and modern made ground which reaches to between 0.5m and 1m beneath the ground surface. The base of the Pleistocene sequence was not reached in any of the trial pits, so its full depth, any deeper variations in sedimentary facies and the nature of the Tertiary bedrock remain unknown. The deposits in each trial pit can be correlated with each other to model the overall sequence across the site (Fig. 1). Three main groups of sedimentary units are present: group I — lower fluvial gravel, group II— alluvial clay-silt and gravel and group III — upper fluvial gravel.

6.9 The lower fluvial gravel occurs in the central and eastern part of the site with its surface at *c.* 8m OD. The alluvial clay-silt and gravel extends across the whole site area between *c.* 8m and 10m OD. The upper fluvial gravel is only present above *c.* 10m OD in the higher western part of the site. The Pleistocene units are broadly horizontal, and have been truncated by the modern ground surface which slopes down west to east across the evaluation area, towards the current Darenth.

6.10 The sequence appears to represent a single cycle of fluvial terrace formation, following Bridgland's model (1994), with a fine-grained clay-silt dominated unit, deposited during warmer interglacial conditions, sandwiched between two coarser gravel units, deposited during the onset of climatic amelioration at the end of the cold glacial stages which preceded and succeded the intervening interglacial.

Depositional and post-depositional history of finds

6.11 The single broken flake came from a more gravelly horizon within the fluvial clay-silt and gravel complex (group II), interpreted as a gravel bar formed by a minor migrating stream channel within the floodplain environment. It was in generally fresh condition, but its sharp edges were slightly abraded. Given the small size of the artefact (*c.* 30mm) it has most likely been transported a short distance by fluvial action, so is not *in situ.*

Correlations and dating

6.12 The Pleistocene sequence at the site has been interpreted as a single cycle of fluvial terrace formation, formed by a previous level of the Darenth, corresponding with a cold-warm-cold climatic cycle. The deposits at the site are already mapped by the BGS as Taplow Gravel, as are the gravels and the overlying Crayford brickearths at the mouth of the Darenth. The height of the alluvial clay-silt/lower fluvial gravel junction at the site (8m OD) corresponds well with the height of the Crayford brickearth/Taplow Gravel junction at the mouth of the Darenth (7.5m OD at its western side), suggesting these sets of deposits are likely to be equivalent. The

brickearth at Crayford contains interglacial sediments dated to Oxygen Isotope Stage 7, a warm period dating to between *c.* 240,000 and 190,000 years ago. It is likely that the sequence at the evaluation site dates to the same period, with the group I and group III fluvial gravels dating to the cold OI Stages 8 and 6 either side of OI Stage 7, or that the whole sequence dates to within OI Stage 7, with the gravels overlying and underlying the clay-silt complex relating to colder climatic oscillations within OI Stage 7.

Significance and potential for current research objectives

6.13 The evidence recovered to date from the site is not of high significance in itself, but it suggests that the site still has reasonable potential (30-50%?) for containing undisturbed or little disturbed archaeological evidence in association with environmental evidence, such as molluscs, ostracods and small vertebrate remains. Such evidence would most likely occur between *c.* 8m and 9m OD at the base, and in the lower part, of the fine-grained clay-silt complex (group IIA), and at the western edge of the evaluation area. If such evidence were to be found, the site would be of national significance for its potential to address a range of questions concerning early human behaviour and lifestyle, the interpretation of material cultural change, and the distribution of early human settlement in relation to environmental and climatic conditions.

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