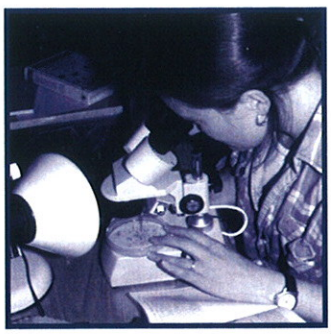
DARTFORD (KE)

DAMPHEX

Land Adjacent to Powdermill Lane and Hawley Road Dartford Kent



Post Excavation Assessment

Oxford Archaeology

16th August 2002

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Bovis Homes Ltd

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POST EXCAVATION ASSESSMENT AND UPDATED PROJECT DESIGN

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16th August 2002

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SUMMARY

Following discovery during field evaluation of a deep sequence of undisturbed Pleistocene deposits across land adjacent to Powdermill Lane and Hawley Road, Dartford, a Palaeolithic archaeological monitoring programme was carried out during construction groundworks.

The general sequence suggested by the evaluation was confirmed. The central part of the site was dominated by yellowish brown brickearth, which overlies a body of gravel that slopes down from west to east. The brickearth was overlain in the north-west corner of the site by a separate body of poorly sorted gravel with lenses of chalky solifluction deposits. The basal part of the brickearth was greyish and sandier in places.

No undisturbed archaeological horizons, flint artefacts or large faunal remains were found. A single flint waste flake was found from a gravel bar within the brickearth. This has been transported from its original place of discard, but probably represents broadly contemporary early hominid occupation. The fact that the artefact is a blade supports the general idea that the sediments broadly correspond to the Crayford brickearths, which produced nationally significant evidence dominated by blade manufacture. Sediment samples from greyish horizons towards the base of the brickearth in the north-central part of the site contained molluscs, ostracods and occasional small vertebrate remains.

The site contains an extensive and deep sequence of Pleistocene deposits, with occasional concentrations of biological evidence. The geological records from the evaluation and monitoring phases of work, combined with the molluscan, ostracod and small vertebrate evidence recovered, should allow the Pleistocene sequence to be reconstructed and dated, and its formation processes and associated palaeo-climate/environment to be determined.

The flint flake can provide a useful contribution to establishing the overall pattern of settlement in England through the climatic fluctuations of the Middle and Late Pleistocene. Given the probable correlation of the deposits at the site with the Crayford brickearths, the results could also provide better information on the climatic and environmental context of the undisturbed occupation horizons discovered there in the late 19th century.

This assessment report summarises the data recovered during archaeological works and their potential for analysis, and outlines a programme of work to study the data collected and report on the results in accordance with the requirements of the specification by Kent County Council (KCC) (2001).

1. INTRODUCTION

1.1 Project background

1.1.1 This report is an assessment of Palaeolithic archaeological investigations carried out by Oxford Archaeology as part of a planning condition for housing development by Bovis Homes on land adjacent to Powdermill Lane and Hawley Road, Dartford, Kent (NGR TQ 542 728).

1.2 Geology and Topography

1.2.1 The site is located *c.*1 km south of Dartford town centre immediately to the west of the River Darent, at the south-east corner of the junction of Powdermill Lane with Hawley Road (Figure 1). The ground surface of the site slopes down west towards the Darent, from *c.* 12.5–13 m OD along its western side to *c.* 8.5 m OD along its eastern side. The site is situated on waste ground which was previously woodland and scrub. This had been cleared before archaeological investigations commenced, leaving a rooted and muddy terrain which was heavily rutted by plant movement.

1.3 Palaeolithic archaeological background

1.3.1 The site is located near the western fringe of a north–south trending Darent 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 Darent 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.* 150 m south-east of the western margin of the evaluation site.

1.3.2 No Palaeolithic archaeological material was known from the site itself. However more than 30 handaxes (plus a few flakes) have been recovered from old gravel quarries (Smith's Pit, Brotherwood's Pit) exploiting the Lynch Hill/Corbets Tey Gravel on the higher ground to the west of Hawley Road, in the area of Churchill Copse and Mitchell Close (Wessex Archaeology 1993). Some of the axes were in fresh condition indicating a lack of post-depositional disturbance. Detailed information on the stratigraphy in these quarries and the contexts of the archaeological material was not recorded. These deposits are mapped as continuing across Hawley Road up to the western boundary of the site.

1.3.3 Further to the north, at the mouth of the Darent where it joins the main Thames at Crayford *c.* 5 km north-east of the site, Taplow Gravel is overlain by a substantial spread of "brickearth" (sandy clay-silt). The Crayford brickearth reaches 7.5 m in thickness at its western boundary, thinning and disappearing eastwards over a distance of almost 1 km. It rests on the surface of the Taplow Gravel, which slopes down eastward from *c.* 7.5 m OD where the brickearth is thickest to *c.* 4 m 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 and 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.

1.3.4 The Crayford brickearth also contained prolific supplementary biological palaeo-environmental evidence such as small vertebrates and molluscs, making it a Palaeolithic archaeological resource of national significance. Although Crayford brickearths have not previously been mapped at the site, pockets overlying the Taplow Gravel were thought likely to be present, and if so would have a high potential to contain significant Palaeolithic archaeological evidence.

1.4 Fieldwork events

1.4.1 There were two phases of fieldwork (Table 1). First, Palaeolithic archaeological evaluation was carried out before development works commenced. Second, following discovery of a deep sequence of undisturbed Pleistocene deposits across the site, a monitoring programme was carried out during construction groundworks.

Table 1: fieldwork events

Event	Date
Field evaluation	February 2001
Monitoring	April-November 2001

2. FIELD EVALUATION

2.1 Aims and objectives

2.1.1 The aims and objectives of the Palaeolithic field evaluation were laid down in the specification produced by the Heritage Conservation Group from Kent County Council (KCC 2000). These were to assess the distribution, nature and Palaeolithic archaeological significance of deposits at the site in respect of:

- 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.

2.2 Methods

2.2.1 Eleven test pits were excavated across the site (Figure 2). They were evenly distributed so far as possible within the restrictions of:

- avoiding foundations within proposed housing plots;
- being placed at the ends of the trial trenches dug to evaluate for recent archaeological evidence.

2.2.2 Each test pit was dug by mechanical excavator with a toothless ditching bucket and was *c.* 1.5 m x 2.5 m in plan and *c.* 2.5 m deep. Sediment was removed in horizontal spits of *c.* 100 mm thickness taking care not to cross stratigraphic boundaries. The depth of each spit and the sedimentary sequence revealed in each test pit were recorded following standard descriptive practices. Once undisturbed Pleistocene deposits were reached, and if the sediments were suitable for sieving (ie. not too stiff and clay-silty), a 100 litre sample from each 250 mm depth of sediment was taken and sieved through a mesh of 10 mm x 10 mm for lithic artefacts and faunal remains. When sediments were not suitable for sieving, mechanical excavation continued in shallower spits of 50–100 mm 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.

2.2.3 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 10 mm, 4 mm, 2 mm, 1 mm and 0.5 mm. The dried residues were examined to see if any significant palaeo-environmental evidence was present.

2.3 Results overview

2.3.1 The results are reported in detail in the evaluation report (Oxford Archaeological Unit 2001), and summarised below.

Stratigraphy

2.3.2 Pleistocene fluvial deposits were present in all the test pits. The base of the Pleistocene sequence was not reached in any of the test pits, so its full depth, any deeper variations in sedimentary facies and the nature of the Tertiary bedrock remain unknown. The sequence appeared to represent a single cycle of fluvial terrace formation, following Bridgland's model (1994), with a fine-grained clay-silt dominated unit sandwiched between two coarser gravel units. 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 River Darent.

2.3.3 Four main groups of deposits were recognised (Table 2).

Table 2: major groups of deposit in Palaeolithic test pits

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

Palaeolithic archaeological evidence

2.3.4 In total 4,100 litres (41 samples) of Pleistocene fluvial sediment were sieved for artefacts and larger faunal remains on-site, with between 700 and 1,500 litres sieved for each of the main depositional groups identified. Fifteen samples (150 litres), mostly from fine-grained deposits of group II, were processed off-site for smaller biological palaeo-environmental evidence.

2.3.5 A flint waste flake was recovered from the group II deposits in test pit 10. 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.

2.3.6 Molluscs were present in the group II deposits in three test pits (1E, 2 and 8). The molluscan evidence was sparse and fragmentary, with whole specimens very scarce. The molluscan evidence seemed to be concentrated in narrow bands within the group II 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.

Conclusions

2.3.7 The fine-grained group II deposits which extended across the site were interpreted as probably equivalent to the Crayford brickearths, and thus of high potential significance for the recovery of biological evidence and undisturbed artefactual evidence, despite the minimal quantity of such evidence identified during evaluation. Therefore, a Palaeolithic archaeological monitoring programme was carried out during construction works.

3. MONITORING

3.1 Aims and objectives

3.1.1 The aims and objectives of the Palaeolithic archaeological monitoring were laid down in the specification produced by the Heritage Conservation Group from Kent County Council (KCC 2001). These were to:

- monitor for undisturbed Palaeolithic archaeological horizons;
- date the Pleistocene deposits present at the site;
- understand the formation process of the Pleistocene deposits.

3.2 Methods

3.2.1 The western half of the site was identified as of highest potential for Palaeolithic archaeological evidence. Groundworks for drainage and foundations were monitored by a Palaeolithic specialist experienced in the recording of Pleistocene deposits (Table 3). The sequence of deposits was recorded across the site so as to build up an overall picture of the stratigraphic sequence. Two bulk sediment samples were taken from the base of one foundation trench of plot 41 and the plot 40 garage for recovery of biological palaeo-environmental evidence.

Table 3: summary of monitored groundworks

Works	Monitored items
Foundation trenches for housing plots	1-9, 13-15, 16-20, 40, 41
Foundation trenches for garage blocks	1-4, 10-11, 12-14, 40, 41
Drainage runs	F11-F12, S11-S21
Manholes	F11, F12, near F13, S11

3.3 Results overview

Stratigraphy

3.3.1 The general sequence suggested by the evaluation was confirmed. The central part of the site was dominated by yellowish brown brickearth, which overlies a body of gravel that slopes down from west to east. The brickearth was overlain in the northwest corner of the site by a separate body of poorly sorted gravel with lenses of chalky solifluction deposits.

Palaeolithic archaeological evidence

3.3.2 No undisturbed archaeological horizons, flint artefacts or large faunal remains were found. Sediment samples from greyish horizons towards the base of the brickearth in the north-central part of the site contained molluscs, ostracods and occasional small vertebrate remains.

Conclusions

3.3.3 The site contains an extensive and deep sequence of Pleistocene deposits, with occasional concentrations of biological evidence. The geological records from the evaluation and monitoring phases of work, combined with the molluscan, ostracod and

small vertebrate evidence recovered, should allow the Pleistocene sequence to be reconstructed and dated, and its formation processes and associated palaeo-climate/environment to be determined.

4. FACTUAL DATA

4.1 Survey data

4.1.1 There is a single A1 large-scale (1:250) site plan showing the site layout and the location of all sections recorded during monitoring. Digital data (CAD files) containing the site layout and the locations of evaluation test pits are held by Oxford Archaeology.

4.2 Stratigraphy

Section drawings and context records

4.2.1 There are 11 section logs from the evaluation phase of work and 20 section drawings from the monitoring phase (Table 4). Each of these is annotated with sedimentary descriptions and sampling locations and volumes.

Table 4: section drawings

Investigation phase	No. drawings	Scale	Size
Field evaluation	11	1:20	A4
Monitoring	20	1:50	A4

Sediment samples

4.2.2 No sediment samples remain from the monitoring. Two bulk samples were taken for sieving for biological palaeo-environmental evidence, and these are considered below.

Stratigraphic overview

4.2.3 The sequence of four major groups of depositional units identified by the evaluation was confirmed (Table 5); no new deposits were found. The longer exposures seen in foundation and drainage trenches allowed better understanding of their geometry and sequence across the western half of the site. The central part of the site was dominated by yellowish brown brickearth (group II), which overlies the lower gravel (group I) at *c.* 8 m OD. The brickearth contained occasional gravel lenses and patches, particularly in the west side of the site where gravel bars are well-developed in the upper part of the brickearth between *c.* 9 m OD and 10 m OD. The brickearth is overlain in the north-west corner of the site by the paler, sandier upper gravel (group III), a separate body of poorly sorted gravel with occasional lenses of chalky solifluction deposits. Bedrock was not reached, although geological mapping and the presence of the lenses of chalky solifluction deposits both suggest it is Chalk.

Table 5: major context groups

Group	Sedimentary unit	Description
IV	Topsoil, modern made ground	Topsoil was present across most of the site, although it was stripped from the NW corner before construction works commenced. It was generally a moderately friable dark grayish brown sandy silt, with moderately common sub-angular to rounded flint pebbles, occasional cbm and moderately frequent roots. It was underlain across most of the site by made ground, generally a moderately compacted sandy clay-silt with occasional flint, pebbles and moderately frequent fragments of modern cbm such as tile, brick and pipeline.
III	Upper gravel	Poorly sorted, sub-horizontally bedded in places, 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.* 11.5 m OD and its base lies at *c.* 10.5 m OD, with an abrupt boundary with the underlying alluvial clay-silt; contains sloping trails and patches of soliflucted chalk in north-west corner of site.
II	Sandy clay-silt with gravel bars	Moderately to well-compacted yellowish brown (with reddish yellow and gray mottling) slightly sandy clay-silts with variable proportions of fine-medium sand and occasional fine gravel clasts; occasional horizons of calcareous sedimentary concretions 1–2 cm diameter present. Occasional substantial gravel lenses and patches in upper parts at western side of site, and becoming softer and grayer in basal parts in centre of site with occasional mollusc-rich horizons. The deposits of this facies form an abrupt contact with the underlying gravel at *c.* 8 m OD in the lower test pits in the eastern half of the site.
I	Lower gravel	Sub-horizontally bedded, moderately to poorly sorted, medium to v. coarse flint gravel in a medium-coarse, occasionally slightly silty, sand matrix

4.3 Lithic artefacts

4.3.1 No artefacts or other evidence of human activity was found during monitoring. A single flint waste flake was recovered during evaluation from a gravel bar within the group II brickearth deposits in trial pit 10 (context 1003, sample 10.2). 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.

4.3.2 The flake was probably not found at the location where it was originally knapped and abandoned, but transported there by fluvial activity associated with formation of the gravel bar. It does however probably reflect early hominid presence contemporary with the general period of formation of the brickearths. Although not too much can be deduced from a single artefact, the fact that it is a blade generally supports the idea that the sediments broadly correspond to the Crayford Brickearths, which produced undisturbed knapping horizons dominated by blade manufacture.

4.4 Faunal remains

4.4.1 No faunal remains were found, other than from fine-mesh sieving of the bulk samples, discussed below (cf. 4.5 Biological/palaeo-environmental evidence).

4.5 Biological/palaeo-environmental evidence

4.5.1 Mollusc-rich horizons were identified during monitoring in the basal silty sands of the group II brickearth in the northern part of the site (Figure 3). Two bulk samples were taken from different nearby locations and sieved for biological palaeo-environmental evidence through a mesh of 0.5 mm (Table 6). Despite this mesh size, much of the resulting residue was considerably smaller, allowing any evidence in the size range 0.25–0.50 mm to be recovered. Sample 1 was relatively rich in molluscan evidence, and also contained a sparse ostracod fauna, as well as several small mammal teeth, including two molars. Sample 2 contained a sparse ostracod fauna, but no other biological evidence.

Table 6: biological palaeo-environmental evidence from bulk sampling

Context group	Sample	Vol. litres	Height in OD	Biological evidence
II	1	30	8.0–8.2	Common molluscs Moderately common small mammals Scarce ostracods
	2	200	8.0–8.4	Scarce ostracods (from picking 25% of residues in size-range 0.25–1.00 mm)

4.6 Dating

4.6.1 The geological context of the site suggests a date in the range Oxygen Isotope Stage 8–6, *c.* 250,000–130,000 years old, if the brickearth deposits are regarded as broadly equivalent to the Crayford brickearths.

4.6.2 No sediment samples were taken for OSL dating due to the high clay-silt content of the brickearth. No biological material suitable for attempting C14 dating was recovered, although the site is probably beyond the limits of that approach anyway. And no faunal remains on which U-series dating could be attempted were recovered.

4.6.3 The molluscs from bulk sample 1 are the only evidence recovered which is suitable for attempting direct chronometric dating of the site. They can be broadly dated by analysis of their amino acids.

5. POTENTIAL FOR ANALYSIS

5.1 Survey data

5.1.1 A site-plan needs to be prepared showing the locations of illustrative sections and logs used to construct the overall sequence across the site (cf. 5.2 Stratigraphy).

5.2 Stratigraphy

5.2.1 The geological records from the site contain sufficient information to create representative north–south and east–west sections across the site, showing the geometry, sequence, thickness, height above OD and variations of the main sedimentary units. This data, supplemented by the sedimentological descriptions made in the field, has the potential to assist in interpreting the age and mode of formation of the deposits. This needs to be supported by a plan showing the location of the sections and logs used (cf. 5.1 Survey data).

5.3 Lithic artefacts

5.3.1 The single flint flake recovered has been adequately described for the evaluation report (Oxford Archaeological Unit 2001). It is culturally undiagnostic and has no potential for behavioural interpretation in light of its likely post-depositional disturbance and its isolation. It does however probably reflect early human presence contemporary with formation of the brickearth sequence. No further analysis of the flake is required.

5.4 Biological/palaeo-environmental evidence

5.4.1 Three categories of biological evidence were present in the samples from the basal brickearth: molluscs, small vertebrates and ostracods.

Molluscs

5.4.2 The molluscs were reasonably abundant in sample 1, from the base of the brickearth. Analysis of the range of species present, and the morphological variety of certain species such as *Pupilla muscorum* which is relatively frequent in the assemblage, has the potential to assist in interpretation of the formation process of the brickearth, and in reconstruction of the prevailing climate and local palaeo-environment during deposition of the sampled horizon.

5.4.3 There is also the potential for the molluscan assemblage to contribute to dating the site by i) biostratigraphy and ii) amino acid analysis.

Small vertebrates

5.4.4 Small vertebrates were moderately common in sample 1, considering its small size, but absent in sample 2. The molars come from small rodents and are identifiable to species, which should assist in reconstruction of the prevailing climate and local palaeo-environment during deposition of the sampled horizon.

5.4.5 The small size of the assemblage will probably restrict its biostratigraphic dating utility, but it is possible that biostratigraphically significant morphotypes may be present.

Ostracods

5.4.6 Ostracods are generally scarce, but due to their concentration by recovery from bulk samples, sufficient quantities are present from both samples 1 and 2 for meaningful analysis. The range of species present can indicate both the prevailing climate and the local palaeo-environment. Many species are extinct or have limited stratigraphic ranges through the Middle and Late Pleistocene, making the ostracod fauna from the site of potential extra use for dating the deposits.

5.5 Dating

5.5.1 The geological and landscape context of the site suggests a date in the range Oxygen Isotope Stage 8–6, *c.* 250,000–130,000 years old, if the brickearth deposits are regarded as broadly equivalent to the Crayford brickearths.

5.5.2 The molluscan, small vertebrate and ostracod assemblage may contribute to dating the site if biostratigraphically significant species or assemblages are present.

5.5.3 The only direct route to dating the site lies in analysis of the amino acids in the mollusc assemblage, concentrating on the species *Pupilla muscorum*, which is relatively abundant. This technique has been shown to provide a reliable approach to establishing relative dating of sites in the same geographic area, provided comparisons are based on analysis of the same species. Several comparative dates exist for *Pupilla muscorum* in south-east England, and the technique has sufficient precision to distinguish between the different Oxygen Isotope Stages that underpin the chronological and climatic framework of the Middle and Late Pleistocene.

6. STORAGE AND CURATION

6.1 Site archive summary

6.1.1 The site archive is summarised in Table 7 below.

Table 7: site archive summary

Type of record	Exists as	Quantity	Stored at (held by)
Plans	A1 paper	1	University of Southampton (FFW-S)
Section drawings	A4 paper records	31	University of Southampton (FFW-S)
Lithic artefacts	Washed and bagged	1	Oxford Archaeology
BW photographic records	Contact print sheets	1	University of Southampton (FFW-S)
	Sheets of negative strips	1	University of Southampton (FFW-S)
Colour photographic record	Mounted slides	5	University of Southampton (FFW-S)
Bulk sample residues	c. 1 litre of graded residue in plastic bags	2	University of Southampton (FFW-S)
Sorted molluscs	Small test-tubes of molluscs sorted by taxa	6	University of Southampton, P. muscorum (FFW-S), University of Coventry, other taxa (DK)
Sorted ostracods	Slides sorted by taxa	9	Natural History Museum (JW)
Small mammal remains	Test-tube with two molars and other fragments	1	Natural History Museum (SP)

6.2 Conservation and storage requirements

6.2.1 There are no particular conservation requirements in the short and medium term, all parts of the archive being stable under dry conditions at room temperature, and stored away from heat sources and out of direct sunlight. The eventual destination of the project archive has not yet been determined.

7. AIMS AND OBJECTIVES

7.1 Summary statement of potential

7.1.1 The site contains an extensive and deep sequence of Pleistocene deposits, with occasional concentrations of biological evidence. The geological records from the evaluation and monitoring phases of work, combined with the molluscan, ostracod and small vertebrate evidence recovered, should allow the Pleistocene sequence to be reconstructed and dated, and its formation processes and associated palaeo-climate/environment to be determined. The flint flake can provide a useful contribution to investigating the overall history of settlement in England through the climatic fluctuations of the Middle and Late Pleistocene.

7.1.2 If the correlation of the deposits at the site with the Crayford brickearths is confirmed by the post-excavation analyses, the results could also provide better information on the climatic and environmental context of the nationally significant undisturbed occupation horizons discovered there in the late 19th century.

7.2 Revised aims and objectives

7.2.1 The overall aims of the post-excavation analysis are detailed in Table 8 below.

Table 8: aims of analysis

Aim	Description
1	To understand the Pleistocene deposits at the site, and realise their potential to contribute to knowledge of the Palaeolithic period
2	To report on the results of the fieldwork and post-excavation analysis

7.2.2 The data collected during fieldwork have the potential to address the following specific objectives (Table 9):

Table 9: revised aims and objectives

Aim	Objective	Details
1	1.1	To establish the nature, geometry and sequence of Pleistocene deposits
	1.2	To interpret their mode of formation
	1.3	To determine the climatic conditions and local palaeo-environment associated with their formation
	1.4	To date the Pleistocene sequence, and establish its correlation with regionally significant deposits and the wider chrono-stratigraphic framework
2	2.1	To produce a comprehensive report of the fieldwork and the results of post-excavation analysis for Kent County Council as per the specification (KCC 2001)
	2.2	To produce a report for publication in a journal concerned with Palaeolithic archaeology and Quaternary science summarising the most significant aspects of the site

7.3 Publication, reporting and dissemination

7.3.1 The publication report can be extracted from the KCC report, the overall structure of which is summarised below (Table 10).

Table 10: KCC report synopsis

Section	Sub-section	Words	Figures
Summary		250	
Acknowledgements		250	
1. Introduction		500	
2. Background		1,000	1. Site location 2. Site locale and geology
3. Aims and objectives		750	
4. Methods		1,000	3. Site layout and test pit locations 4. Bulk sampling locations
5. Results	Stratigraphy	1,000	5. E–W geological summary cross-section 6. N–S geological summary cross-section
	Molluscs	1,000	
	Small vertebrates	1,000	7. Rodent teeth
	Ostracods	1,000	
	Amino acid dating	500	
	Palaeolithic archaeology	100	8. Lithic artefact
6. Discussion		1,000	
7. Conclusions		500	
Totals		9850	

8. METHODS

8.1.1 The proposed analysis and reporting phases have seven main elements (Table 11):

Table 11: analysis and reporting main elements cross-referenced with objectives

Element	Description	Objectives
1	Stratigraphy	1.1, 1.2
2	Mollusc analysis	1.2, 1.3, 1.4
3	Small vertebrate analysis	1.2, 1.3, 1.4
4	Ostracod analysis	1.2, 1.3, 1.4
5	Amino acid dating	1.4
6	KCC report preparation	2.1
7	Publication	2.2

8.2 Stratigraphy

8.2.1 The existing stratigraphic records need to be collated to create draft north–south and east–west sections across the site that show the geometry and stratigraphic relationships of the sedimentary units present. Accompanying text needs to be prepared describing each of the sedimentary units. Specific tasks, duration and resource allocation are summarised in Table 13. *Tasks 1 and 2*

8.3 Mollusc analysis

8.3.1 The sieved residues from bulk sample 1 need to be sorted for identifiable molluscan evidence under a 10–60x binocular microscope, and identified to species. The results need to be tabulated and a report written interpreting the assemblage with reference to taphonomy, formation process of the sedimentary unit from which they came, palaeo-climate, local palaeo-environment and dating implications. Specific tasks, duration and resource allocation are summarised in Table 13. *Task 3.*

8.4 Small vertebrate analysis

8.4.1 The sorted small vertebrate remains from bulk sample 1 need to be identified to species where possible and the identifiable elements drawn. Then a report needs to be written interpreting the assemblage with reference to taphonomy, formation process of the sedimentary unit from which they came, palaeo-climate, local palaeo-environment and dating implications. Specific tasks, duration and resource allocation are summarised in Table 13. *Tasks 4, 5 and 6.*

8.5 Ostracod analysis

8.5.1 The sieved residues from bulk samples 1 and 2 need to be sorted under a high-magnification binocular microscope, and identified to species. The results need to be tabulated and a report written interpreting the assemblage with reference to taphonomy, formation process of the sedimentary unit from which they came, palaeo-climate, local palaeo-environment and dating implications. Specific tasks, duration and resource allocation are summarised in Table 13. *Task 7.*

8.6 Amino acid dating

8.6.1 Suitable specimens and fragments of the mollusc species Pupilla muscorum need to be sorted from the molluscan assemblage and sent to the Amino Acid Geochronology Laboratory in Arizona, USA, where they need to have the extent of D–L amino acid epimerisation measured by the conventional ion exchange method. A single block of 5 runs should be sufficient, requiring 12–15 specimens. The results need to be interpreted by a different specialist familiar with such data from south-east England, and conclusions reached as to the dating of the Powdermill Lane deposits, and their correlation with significant regional deposits such as the Crayford Brickearth and with the overall OI Stage framework. Specific tasks, duration and resource allocation are summarised in Table 13. *Tasks 8 and 9.*

8.7 KCC report preparation

8.7.1 The results of the different post-excavation analyses need to be synthesised and edited into a single report text including a discussion and conclusion over interpretation and dating of the Pleistocene sequence, and any wider implications for understanding of the Palaeolithic period. Draft illustrations need to be drawn up to publication quality, and the overall report collated, bound and copies submitted to Bovis Homes, KCC and the specialists involved in its preparation. Specific tasks, duration and resource allocation are summarised in Table 13. *Tasks 10, 11, 12, 13 and 14.*

8.8 Publication

8.8.1 The most important results and conclusions from the KCC report need to be edited down to a paper for publication in a national journal concerned with Palaeolithic Archaeology and Quaternary Science such as *Proceedings of the Geologists Association*. Specific tasks, duration and resource allocation are summarised in Table 13. *Tasks 15 and 16.*

9. RESOURCES AND PROGRAMMING

9.1 Project team

Table 12: project team

Personnel	Job description	Key relevant skills
FF Wenban-Smith (FFWS)	Overall co-ordinator and text preparation	Senior Research Fellow, Department of Archaeology, University of Southampton. Long experience directing/co-ordinating Palaeolithic/Pleistocene fieldwork and report preparation, for instance at Red Barns (Hampshire), Swanscombe (Kent) and for CTRL at Ebbsfleet with Oxford Archaeology
Darrell Kaufman (DKa)	Amino Acid dating laboratory analysis	Laboratory director, Amino Acid Geochronology Laboratory, Northern Arizona University, Department of Geology
David Keen (DKe)	Molluscs	Professor, Department of Geography, University of Coventry. Vast experience Pleistocene molluscan analysis from southeast England. Co-author standard textbook Pleistocene Environments in the British Isles
Simon Parfitt (SP)	Small vertebrates	Senior Research Fellow, Natural History Museum. Extensive experience Pleistocene vertebrate analysis form southeast England. Co-director Boxgrove project
John Whittaker (JW)	Ostracods	Curator Micro-palaeontology, Natural History Museum. Leading expert on Pleistocene freshwater and marine ostracods
Martin Bates (MB)	Amino acid dating interpretation	Lecturer, Department of Archaeology, University of Wales, Lampeter. Long experience Quaternary research, molluscan analysis and interpretation of amino acid results in southeast England and northern France
Alistair Barclay (AB)	Oxford Archaeology Senior Project Manager	Experienced Project Manager for a range of multi-disciplinary projects
Illustrator	Oxford Archaeology graphic preparation	Experienced in lithic artefact illustration, preparation of draft illustrations for publication and manipulation of CAD images

9.2 Project management

9.2.1 Co-ordination of the various Quaternary scientific specialists and reports will be carried out by Francis Wenban-Smith, who will liaise with the Oxford Archaeology project manager Alistair Barclay.

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11. ACKNOWLEDGEMENTS

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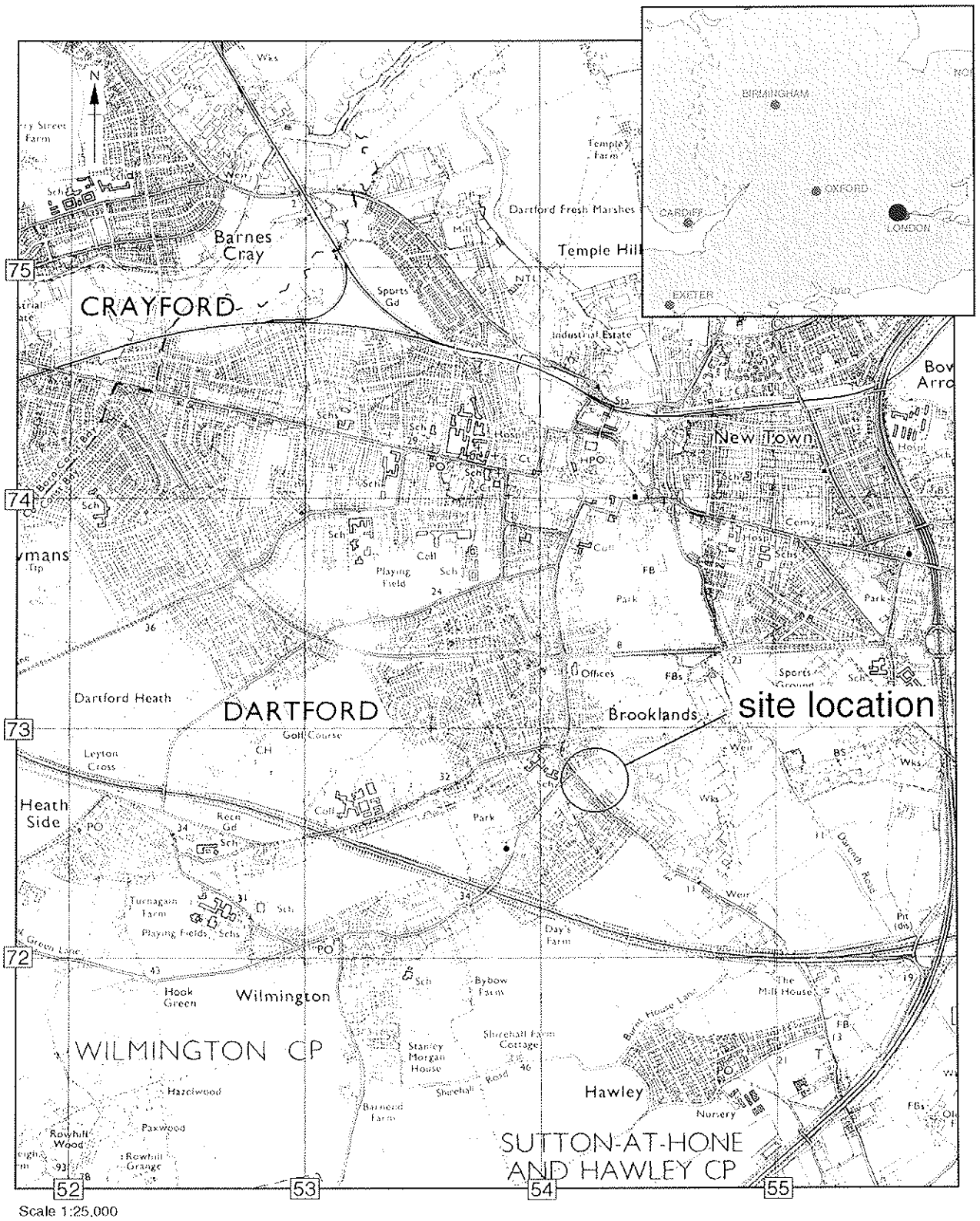

Figure 1: Site location.

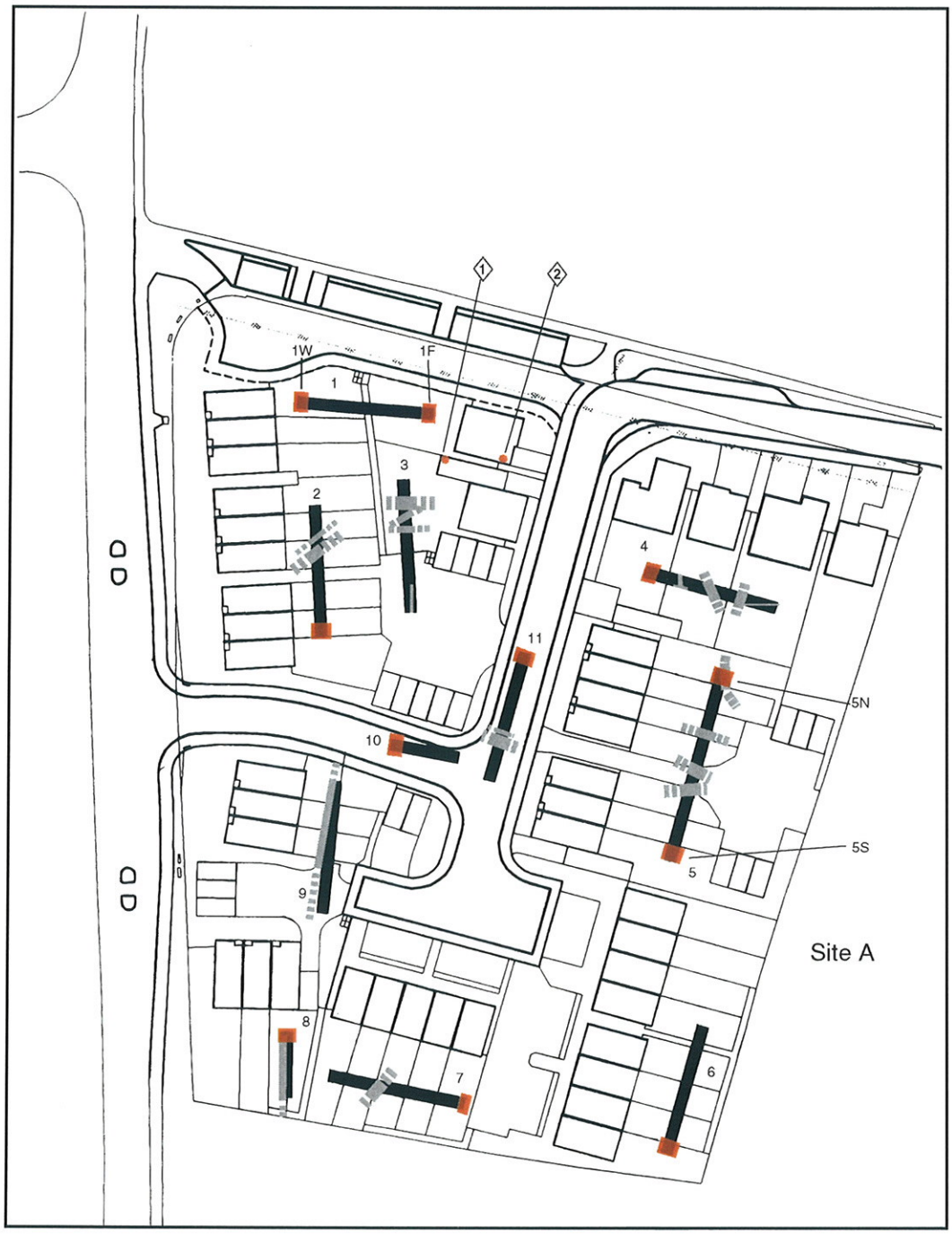

Figure 2: Location of Palaeolithic test-pits and bulk samples ◇1 and ◇2

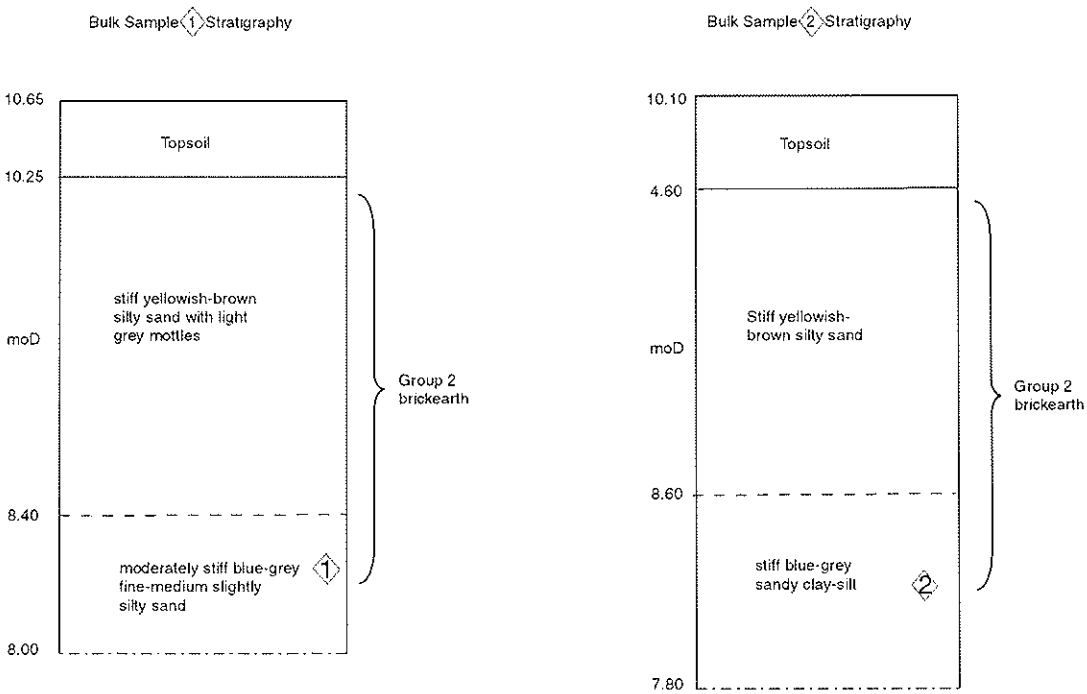

Figure 3: Bulk sampling locations 1 and 2

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