



KDK ARCHAEOLOGY LTD

Archaeological Evaluation Report

Former Ascot Arms
Central Avenue
Gravesend
Kent



Quality Check

<i>Author</i>	Derek Watson PhD	<i>Version</i>	764/GAR/2.1	<i>Date</i>	14.08.2023
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Unit 3 Leighton Road Leighton Buzzard Bedfordshire LU7 1LA
Tel: 01525 385443
Email: office@kdkarchaeology.co.uk
Website: www.kdkarchaeology.co.uk





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Summary

In April 2023, KDK Archaeology Ltd undertook an Archaeological Evaluation at the former Ascot Arms, Central Avenue, Gravesend, Kent, after the demolition of the extant building, and prior to the re-development of the site. The evaluation comprised the excavation of four trial trenches within the footprint of the development. However, these only revealed an apparently natural soil profile (topsoil, subsoil, natural geology) underlying a modern made-ground. As there was no evidence of any form of truncation, or any disturbance, the site was probably situated outside the core settlement area, though it might lie between widely dispersed features. A concurrent geoarchaeological investigation established the presence of Late Glacial periglacial deposits and a putative 'soil' lens in Trenches 1 & 4.

1 Introduction

1.1 In April 2023, KDK Archaeology Ltd undertook an Archaeological Evaluation at the former Ascot Arms, Central Avenue, Gravesend, Kent. The project was commissioned by Souterrain Archaeological Services on behalf of the Avery Healthcare Group, and was carried out according to a Written Scheme of Investigation prepared by Souterrain (2022), and approved by Casper Johnson, Senior Archaeological Officer (SAO) of Environment, Planning and Enforcement, Kent County Council statutory consultant and Archaeological Advisor (AA) to the Local Planning Authority (LPA), Gravesham Borough Council. The relevant planning application reference is 20220207.

1.2 *Planning Background*

This project has been required under the terms of National Planning Policy Framework (NPPF) as a condition of planning permission for the development of the site.

1.3 *The Site*

Location and Description

The development site is situated in the town and civil parish of Gravesend, in the administrative district of Gravesham Borough Council at National Grid Reference (NGR) TQ 6493 7242 (Fig. 2). It is located on the site of the now demolished 1930s public house, the Ascot Arms, on a plot of land that is approximately 0.4 of a hectare at on the south-western corner of the junction of Central Avenue (to the west) and Ascot Road (to the north). The site is bounded to the east by Aintree Close (road), and to the south by the Central Avenue Open Space (park).

Geology and Topography

The bedrock geology is White Chalk Subgroup (BGS 2021a). The formation is defined as 'Chalk with flints. With discrete marl seams, nodular chalk, sponge-rich and flint seams throughout. Typology of flints and incidence of marl seams is important for correlation... ..The lower boundary is conformable on the Grey Chalk Subgroup...'. The site ground level is c. 30m AOD.

Proposed Development

The proposal calls for the demolition of the existing former public house building and redevelopment to provide a new 62-bed care home (Use Class C2) in a three-storey building, with associated access, car and cycle parking, and structural landscaping and amenity space provision (Fig. 3).



Figure 1: Site location (scale 1:25,000)

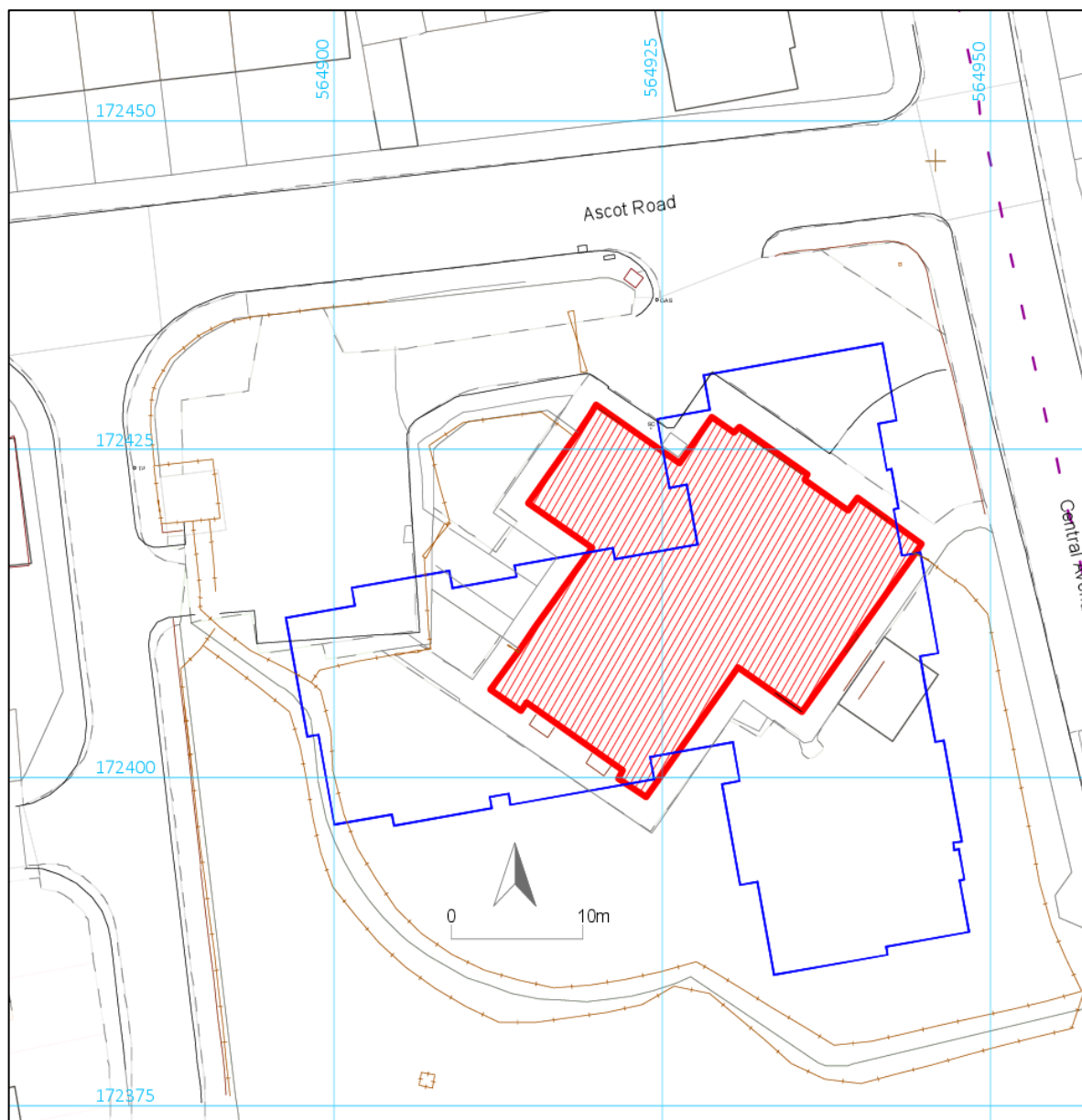


Figure 2: Site layout (demolished Public House in red; development in blue; scale 1:500)

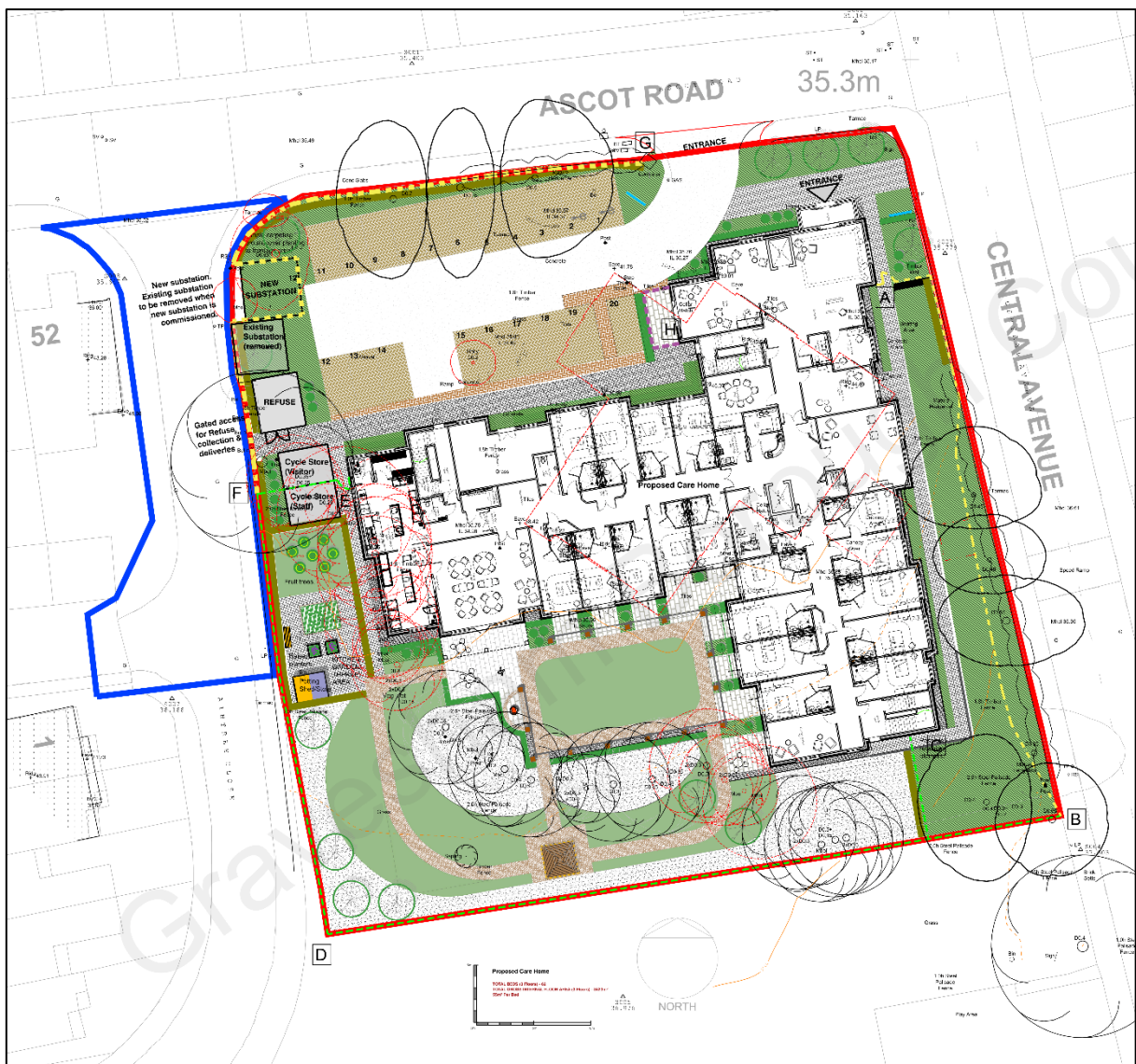


Figure 3: Proposed development plan (scale as shown)



2 Aims and Methods

2.1 Aims

The aims of this project as defined in the approved WSI (Souterrain 2022) were:

- to establish the broad presence/absence, nature, character, distribution, extent and depth of Quaternary deposits across the site and, where necessary, to correlate these as a deposit model
- to develop a preliminary assessment of the possible Palaeolithic potential of the site
- to establish a broad preliminary model for the site's archaeological potential, by identifying preliminary Historic Environment Areas (HEAs) of different character and potential
- to examine the potential Palaeolithic landscape survival and an adequately record of the nature of geological deposits
- to determine the presence / absence of Pleistocene Residual Surface Deposits and the presence/absence of artefacts and palaeo-environmental evidence

2.2 Methods

The methods used were as follows:

- As originally proposed, the evaluation required the excavation of three trial trenches measuring: Trench 1, 12 m x 2m, Trench 2, 10m x 2m, and Trench 3, 8m x 5m; a discretionary (later named Trench 4), a single bucket-wide, was to be excavated to identify and record any Palaeolithic deposits (Fig. 4).

2.3 Standards

The work conformed to the following requirements:

- The relevant sections of the Chartered Institute for Archaeologists' *Standard & Guidance for Archaeological Field Evaluation* (CIfA 2020a)
- The Chartered Institute for Archaeologists' *Code of Conduct* (CIfA 2021)
- Current English Heritage guidelines (EH 2008, HE 2015b)
- Kent County Council 2019. South East Research Framework, Resource Assessment and Research Agendas, <https://www.kent.gov.uk/leisure-and-community/history-andheritage/south-east-research-framewo>



Figure 4: Trench location plan (scale 1:250).



3 Archaeological and Historical Background

- 3.1 The Heritage Impact Assessment (HIA) undertaken by Souterrain (2021) identified two main aspects of buried archaeological potential and significance within a 1km radius Study Area: the Palaeolithic period and the Roman period.

The following is paraphrased from Souterrain (2022: 7-8):

Palaeolithic

The HIA considered the study site to have a low potential for archaeology of the Palaeolithic periods. There are no recorded heritage assets of Palaeolithic date at the development site, or within the 1km study area covered by the HIA. Notwithstanding this, in terms of Palaeolithic 'site' presence, it is presently acknowledged by the South East Research Framework (SERF) that the importance of a specific locality can only rarely be determined with confidence in advance of fieldwork. The ability to perform Predictive Modelling ahead of development and fieldwork is recognized as a key research priority. But this requires a much-improved understanding of the distribution and prevalence of Pleistocene deposits. It is emphasised that the actual boundaries of geological deposits and outcrops are only broadly known, and thus only broadly defined on maps. The approach to assessing the Early Palaeolithic resource in the South East is thus deposit centred as opposed to find-centred. Of fundamental importance to research priorities are 'incremental minor snippets of data', with equal weight given to sites that lack actual artefactual evidence, but other vital information they may contain (e.g., palaeo-environment, palaeo-climate, chrono-stratigraphy). Thus, the development site has the potential to produce a minor dataset via controlled palaeo-environmental investigation that will contribute to research into, and understanding of, the period.

It is possible that the development site may contain Pleistocene Residual Surface Deposits of potential research interest, comprised of clay-with-flints or colluvial deposits. Concerning clay-with-flints deposits, current SERF research priorities include: the identification of in-filled dolines containing Lower to Middle Palaeolithic material; the assignment of artefacts to a particular stage of the Palaeolithic and; determination of the levels of Lower to Middle Palaeolithic activity. Priorities with regard to colluvial deposits include the identification of colluvial/solifluction that may contain minimally-disturbed concentrations of Palaeolithic artefacts (Wenban-Smith, 2019).

Roman

A portion of a Roman cremation cemetery was discovered about 250 m to the southeast the PDA. The HIA also noted that the development site lies adjacent to the course of a historic trackway (now Central Avenue), of unknown origin. Other than this, there have been only two chance finds of artefacts of the Roman period within the 1 km study area covered by the HIA. In contrast, however, there is an emerging picture of an extensive Romano-British enclosed rural landscape to the immediate south of the study area, where landscape character, elevation and topography are comparable to that of the development site. In terms of significance, the SERF acknowledges that 'all instances of [Romano-British] rural settlement sites are valuable resources that require mapping, phasing, dating and comparison' in order to determine patterns of continuity and change. (Allen *et al.*, 2019)



4 Results

4.1 Introduction

In April 2023, KDK Archaeology Ltd undertook an Archaeological Evaluation at the former Ascot Arms, Central Avenue, Gravesend, Kent prior to the redevelopment of the site. A total of 4 evaluation trenches, with an area of 95.87m², were mechanically excavated using a 14-tonne digging machine fitted with a 2m wide toothless bucket (Fig. 4; Plates 1-13). The location of Trench 3 was altered due to the presence of a large spoil heap situated in the area originally proposed (Fig. 4). The measurement of the trenches was as follows (L x W x D; area):

Trench 1: 12m x 2m x 0.8-3m; 24m²

Trench 2: 10m x 2m x 0.8-1.3, 20m²

Trench 3: 8m x 5m x 0.65-1.3m; 40m²

Trench 4: 4.75m x 2.5m x 0.8-2.3m; 11.87m²

The stratigraphy encountered, except for the natural layers revealed, was uniform across the excavated area and comprised (Figs. 5-7; Plates 3 & 8):

Made-ground (101, 201, 301): Mixed, rooted, dark brown loam containing modern rubble, 0.05-0.2m deep.

Topsoil (102, 202, 302): Mid-brownish grey silty clay, 0.2-0.3m deep.

Subsoil (103, 203, 303, 401): Mid-brown slightly clayey silt, with occasional chalk flecks (colluvial brown earth), 0.2- 0.4m deep.

Natural geology (104, 204, 304, 402): Orangey brown, slightly sandy clay with flints, > 0.4- >0.65 deep.

Natural geology (105, 403): Buff textured chalk marl, 0.2-0.25m deep.

Natural geology (106): Weathered periglacial chalk, >1.7m deep.

Natural geology (404): Weathered periglacial chalk, with a lens of chalk marl and flints, and an interglacial lens of decalcified silty clay, >1.3m deep.

Trench 4 was excavated to identify and record Palaeolithic deposits, and a sondage for this purpose was also excavated within Trench 1 (Figs 4, 8&9). The details of the sampling (Fig. 9), and palaeo-environmental and geoarchaeological investigation in Trenches 1, and the full details of Trench 4 are presented in Appendix 3 (Allen 2023).

The natural geology in Trench 2 (204) was over-dug at the ENE end due to the presence of a large quantity of charcoal that upon investigation was clearly the remnants of charred roots. On completion of the excavations no significant archaeological finds, features, or deposits were identified within the footprint of the development.

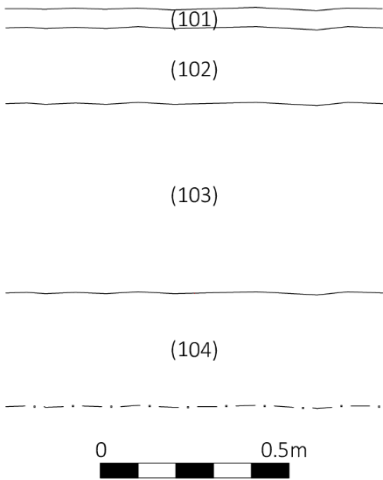


Figure 5: Trench 1 schematic stratigraphic profile (scale 1:20)

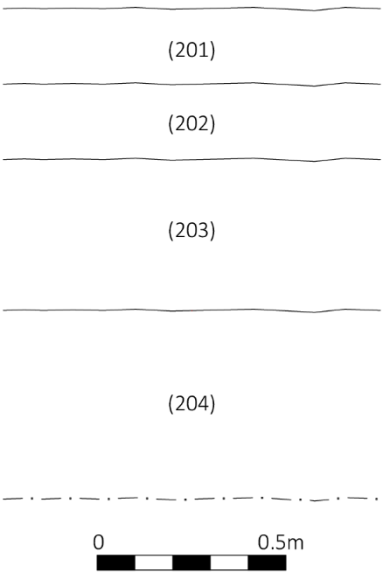


Figure 6: Trench 2 schematic stratigraphic profile (scale 1:20)

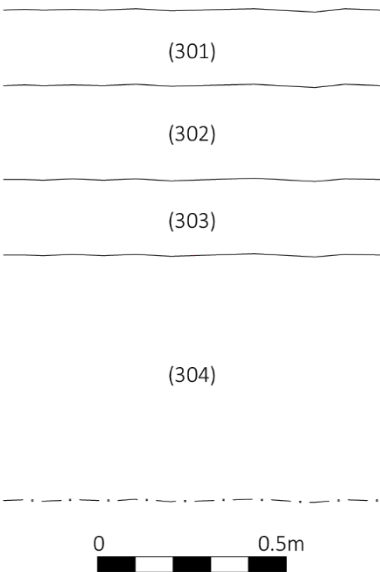


Figure 7: Trench 3 schematic stratigraphic profile (scale 1:20)



Northeast facing section of sondage at the northwest end of Trench 1

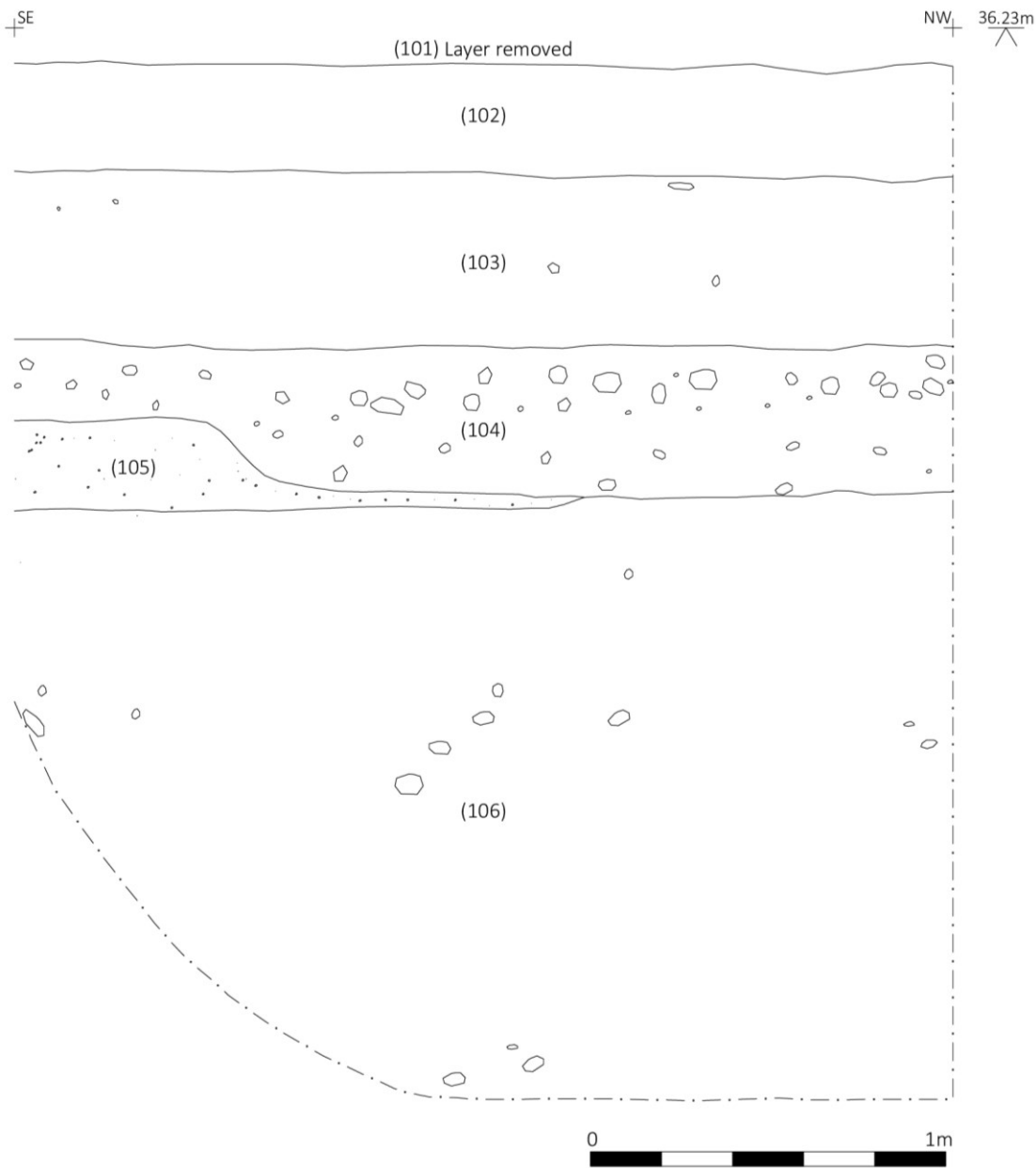


Figure 8: Trench 1 stratigraphic profile of sondage section (scale 1:20)



Northeast facing section of pub cellar, before excavation of Trench 4

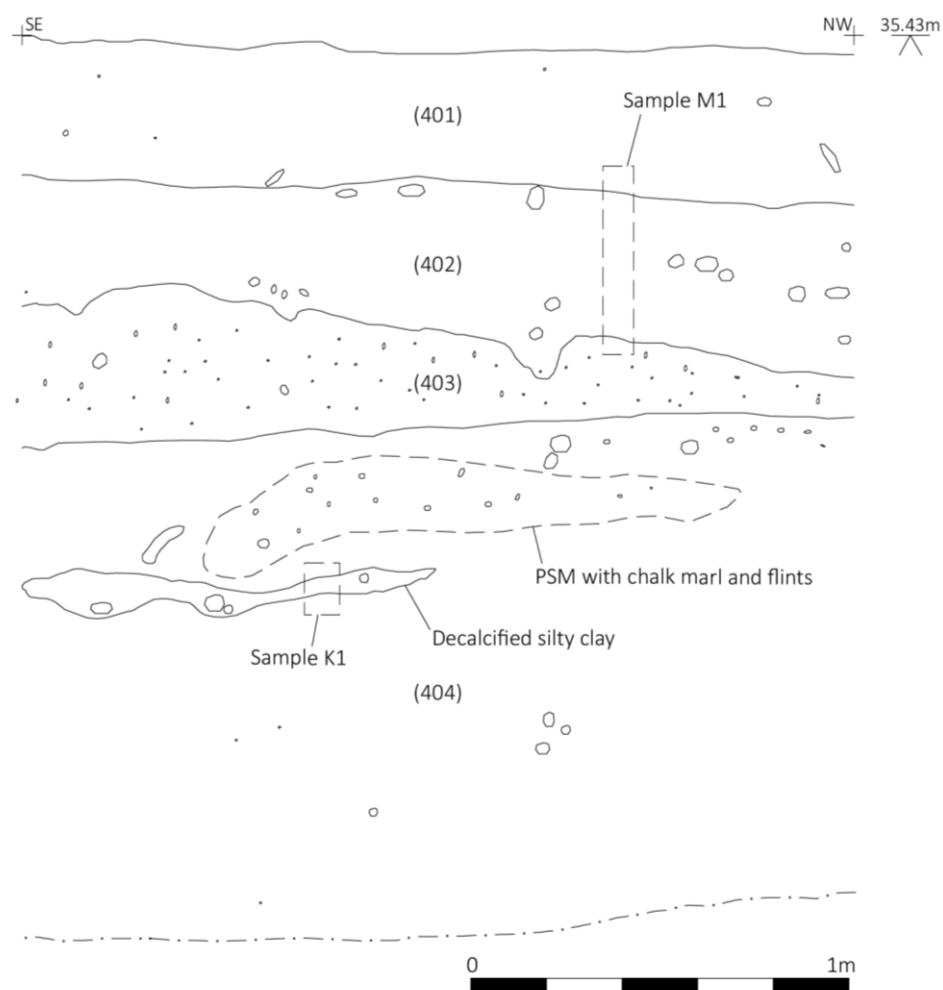


Figure 9: Trench 4 stratigraphic profile of sondage section (scale 1:20)



Plate 1: Trench 1, looking SE



Plate 2: Trench 1, looking NW



Plate 3: Trench 1 stratigraphy



Plate 4: Trench 1, NE facing section of geoarchaeological sondage at the NW end of trench, looking SW



Plate 5: Trench 2, looking ESE



Plate 6: Trench 2, looking WNW



Plate 7: Trench 2 stratigraphy



Plate 8: Trench 3, looking SSE



Plate 9: Trench 3, looking NNW



Plate 10: Trench 3 stratigraphy



5 Conclusions

In April 2023, KDK Archaeology Ltd undertook an Archaeological Evaluation at the former Ascot Arms, Central Avenue, Gravesend, Kent, after the demolition of the extant building and prior to the re-development of the site. The evaluation comprised the excavation of four trial trenches within the footprint of the development. However, these only revealed an apparently natural soil profile (topsoil, subsoil, natural geology) underlying a modern made-ground. As there was no evidence of any form of truncation, or any disturbance, the site was probably situated outside the core settlement area, though it might lie between widely dispersed features.

The geoarchaeological investigation aimed to elucidate the Palaeolithic human environment (the detail on the complexity and potential of the probable Late Glacial deposits (and possible Holocene colluvial material) that were sampled and recorded are presented in Appendix 3). The soil profile was characterised as Late Glacial periglacial deposits (Combe deposits), fine-grained weathered chalky silt and clay matrix with clasts of chalk and flint and some erratic pebbles formed at the edges of glaciers or an ice-covered region by solifluction/gelifluction (the gradual downslope movement of wet soils). However, the poor preservation of palaeo-environmental evidence in the soil samples (e.g., pollen and charred remains) collected during the excavation, and the lack of evidence for human activity, either directly or indirectly, inhibits both any further discussion and achieving most of the original aims of the research.



6 Acknowledgements

KDK Archaeology is grateful to Martin Wilson BA MCIfA for commissioning this report on behalf of Avery Healthcare Group. Thanks are also due to Dr Michael J Allen, MCifA of Allen Environmental Archaeology for overseeing the geoarchaeological aspects of the project.

The fieldwork was carried out by Mike Allen and Chris Martin-Taylor BSc. The report was written by Derek Watson PhD, and edited by David Kaye BA ACIfA.



7 Archive

- 7.1 The project archive will comprise:
1. Written Scheme of Investigation
 2. Initial report
 3. Monitoring sheets
 4. Site drawings
 5. Client's site plans
 6. List of photographs
 7. Specialist reports
- 7.2 The digital archive will be deposited with ADS.



8 References

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Secondary Sources

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Appendix 1: Photograph List

SITE NO/CODE: 764GCA		Site Name: Former Ascot Arms, Central Avenue, Gravesend, Kent
Shot	View	Subject
1	SSE	Trench 3
2	NNW	Trench 3
3	SSE	Trench 3 stratigraphy
4	ESE	Trench 2
5	WNW	Trench 2
6	SSW	Trench 2 stratigraphy
7	SE	VOID
8	SE	Trench 1
9	NW	Trench 1
10	NE	Trench 1 stratigraphy
11	SW	NE facing section of sondage at the NW end of Trench 1
12	SW	Trench 4 - NE facing section of excavated cellar
13	NW	Trench 4 - Upper layers removed for sampling
14	NW	Trench 4 - Upper layers removed for sampling



Appendix 2: Excavation Summary Tables

Section Register

Sheet No	Drawing No	Scale	Contexts
1	1	1:10	NE facing section of sondage at the NW end of Trench 1
2	2	1:20	NE facing section of excavated cellar Trench 4



Appendix 3: Specialist Report

FORMER ASCOT ARMS SITE, ASCOT ROAD, GRAVESEND,
KENT (764/GCA):

Palaeo-environmental and Geoarchaeological Assessment

by **Michael J. Allen, PhD, MCIfA, FLS, FSA**
with **Catherine Langdon, PhD**

version AEA 488.04.01
4 August 2023

for:-

David Kaye, KDK Archaeology

AEA: Allen Environmental Archaeology

Redroof, Green Road, Codford St. Peter, WARMINSTER, Wiltshire, BA12 0NW (Tel: 07828 103454)



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**AEA: Allen Environmental Archaeology**

Redroof, Green Road, Codford St. Peter, WARMINSTER, Wiltshire, BA12 0NW (Tel: 07828 103454)



ver 1.0

**FORMER ASCOT ARMS SITE, ASCOT ROAD, GRAVESEND, KENT
(764 / CGA):*****Palaeo-environmental and Geoarchaeological Assessment***

The site of the former Ascot Arms public house site was visited on 27th April 2023 and full geoarchaeological records were made of a key profile (trench 4) which was monolith sampled and subsampled (Allen 2023). In addition two bulk samples taken and processed by KDK Archaeology Ltd from the key deposits (colluvial brown earth (401) and Clay-with-Flints/brickearth 402, and flots (and residues) assessed.

The report there provides the palaeo-environmental assessment, land snail analysis (as presented previously; Allen 2023), the pollen assessment, the geoarchaeology and magnetic susceptibility profiling and deposit model, consideration of OSL dating, and full recommendations for any further work (ie, analysis) if and as appropriate.

Location geology and soils

The site is located at c. 36m OD on the gently sloping north / north-east facing slope of Wrotham Road dry valley overlooking the Thames (Fig. 1). The solid geology is mapped by the British Geological Survey as Lewes Nodular Chalk Formation, Seaford Chalk Formation and Newhaven Chalk Formation (Undifferentiated) and no superficial deposits are recorded on this site or locally. Nevertheless, there is the potential for the concurrence of significant Palaeocene Clay-with-Flints, Quaternary River Terrace 1 Deposits (gravels), brickearth and Head deposits over the Cretaceous Chalk in Kent, with significant archaeologically potential. The area is mapped as typical brown calcareous earths of the Coombe 1 Association, with typical argillic brown earths of the Fyfield 4 Association adjacent and pelo-alluvial gley soils of the Wallasea 1 Association on the floodplain fringing the Thames (Jarvis *et al.* 1983; 1984).

It was possible that the site may contain Pleistocene residual surface deposits of potential archaeological significance. The current South-East Research Framework (SERF: Kent County Council 2019) indicates the potential for such deposits to relate to Lower to Middle Palaeolithic and that colluvial/solifluction deposits may contain minimally-disturbed concentrations of Palaeolithic artefacts (Wenban-Smith 2019).

Aims

The site were to examine the Quaternary deposits, and to provide an indication of their nature, distribution and Palaeolithic potential. The aims were to:

- establish the broad presence/absence, nature, character, distribution, extent and depth of Quaternary deposits across the site and, where necessary, to correlate these as a deposit model
- determine their palaeo-environmental potential from both charred plant and charcoal remains and pollen



- develop a preliminary assessment of the possible Palaeolithic potential of the site
- establish a broad preliminary model for the site's archaeological potential

The sediment profile (Trench 4; Ascot Arms Cellar) (Figs 3 & 4)

The removal of the cellar wall exposed a section up to 2.5m deep comprising 0.4m of fine-grained colluvial brown earth (401) over brickearth (402), over periglacial deposits (Coombe Deposit, 403 & 404) with a possible late Glacial decalcified soil horizon, or lens of soil material, over cleaner Coombe Deposit / weathered chalk (Figs 3 & 4). The section was cleaned, photographed and recorded. The fine-grained, almost stone-free, brickearth and colluvial brown earth was sampled in a 50cm-long monolith (M1) and the putative buried soil within the Coombe Deposit was sampled as an undisturbed soil (kubiena) block, K1 (Figs 7, 6 & 7). Optically stimulated luminescence (OSL) sampling was not possible of the soil lens in the Coombe Deposit as it was too thin and the Coombe Deposits contained chalk lumps. The fine-grained post periglacial deposits (brickearth and colluvial brown earth) were considered to be late glacial or early Holocene and not sampled for OSL dating - though samples were subsequently be taken from the lower part of the brickearth in base of monolith M1 (78cm) and the upper part of the brickearth (60cm).

A portion of the section was then machine excavated in 9 × 10cm spits (Fig. 4) and the spoil from each searched for artefacts. Two bulk samples of 30 litres were taken from the two of the spits from different deposits to be (dry or wet) sieved for artefacts and clast analysis to assist in characterising the deposits. The Coombe Deposits were not examined further here as they were examined to a depth of 3m (ie, 2m of deposits) in trench 1. Sediment and pedological terminology Hodgson (1997).

Samples

Two undisturbed samples were taken from the trench 4 (samples 1 and 2); a monolith M1 (at 33-83cm) through the base of the colluvial brown earth (401) and brickearth (402; Figs 5 & 6), and a soil block (K1) at 129-142cm of a lens of putative soil material within the late glacial Coombe Deposits (Figs 5 & 7). The undisturbed samples were cleaned (Figs 8 & 9) and described and subsampled.

A total of 30 samples or subsamples were removed for consideration for assessment (Table 1).

<i>Sample</i>	<i>Deposit</i>	<i>Bulk (30 L)</i>	<i>Pollen</i>	<i>Soil micro</i>	<i>Mag Susc</i>	<i>OSL</i>	<i>Totals</i>
1	Colluvial soil (401)	1	-	-	-	-	1
M1		-	-	-	1	-	1
2	Brickearth (402)	1	-	-	-	-	1
MI		-	11	-	9	2	22
K1	Periglacial (403/4)	-	1	-	1	-	2
	?LG soil (in 403/4)	-	1	1	1	-	3
Total		2	13	1	12	2	30

Table 1. List of samples and subsamples removed from the undisturbed soil samples



The geoarchaeological record (and subsamples)

Depth	Pollen	Descriptions
<i>samples</i>		
0-36cm (401)		Dark yellowish brown (10YR 4/6) stone-free massive silt to silt loam, rare medium subangular flints and chalk flecks, common fine macropores, rare brick material locally, especially near stripped surface (?pushed into the deposit), abrupt to clear boundary <i>Colluvial brown earth</i> MS 35cm
36-81cm (402)	42 46 50 54 58 62 66 70 74 78 82	Strong brown (7.5YR 4/6) dense to firm silty clay loam, massive, essentially stone-free, but rare/occasional subangular brecciated flints, rare small to medium rounded pebbles especially towards base, rare vertical voids to 7mm diameter with mixed infill and fine (<2mm stones), sharp wavy boundary <i>Brickearth</i> MS 40cm MS 45cm MS 50cm MS 55cm MS 60cm OSL 60cm MS 65cm MS 70cm MS 75cm MS 80cm OSL 78cm MS 82cm
81-87cm (403)		(10YR 6/6 to 7/4) calcareous silt marl with common fine chalk pieces and rare medium subrounded chalk pieces, deposit thicker to south, clear to abrupt boundary <i>Late Glacial Periglacial solifluction (gelifluction) material: Upper Coombe Deposit</i> MS 82cm
87-120cm (403)		Brownish yellow (10YR 6/6) calcareous silt with many chalk pieces, some medium flints, abrupt wavy boundary <i>Late Glacial Periglacial solifluction (gelifluction) material: Coombe Deposit</i>
120-240cm (404)	K1 132 138	White to pale yellow chalk marl with common small and medium and few large chalk subangular and surrounded chalk pieces clear to abrupt boundary @ 137-146cm Dark yellowish brown (10YR 4/6) decalcified, non-calcareous, silty clay loam stone-free with rare small/very small chalk pieces and some medium flints, forming a wavy lens, with sharp contacts above and below – possibly soil material but no pedological/soil structure seen– possibly Windermere interglacial (Allerød) soil material (At sampling point soil is only 4cm thick 137-141.5cm) <i>Glacial Periglacial solifluction (gelifluction) material: Coombe Deposit (Upper chalky marl rubble)</i> MS 137 (soil)
170-240cm+ (404)		White to pale yellow chalk marl cementing common medium and some large chalk subangular and surrounded chalk pieces <i>Massive periglacial solifluction (gelifluction) material or weathered Chalk bedrock (Lower chalky marl rubble)</i>

Pollen samples in red and bold selected for assessment

Artefact and Clast Analysis

Two bulk samples of c. 30 litres were taken from spits 2 and 7 of the deposits in trench 4.



Sample 1: 30L bulk sample of colluvial brown earth (401) spit 3

Sample 2: 30L bulk sample of brickearth (402), spit 7

Samples were taken for sieving/wet sieving to 10mm, however, KDK Archaeology processed them by flotation with flots retained on 0.5mm mesh sieves and residues on 1mm mesh. This facilitated both clast analysis (residues) and palaeo-environmental assessment (flots). The unsorted and sorted residues were used for clast analysis. The clasts >1mm recovered from processing were removed to the AEA laboratory facilities. Coarse clasts >10mm were fractionated (75mm, 50mm, 20mm and 10mm), and then fine clasts (>4mm, >2mm and >1mm) weighed, and recorded to characterise the deposits (Tables 2 & 3; Appendix 1). No artefacts (ie, struck flints) were present. The coarse residues (>10mm) were discarded after recording and reporting, and the fine residues (>1mm) discarded after full microscope sorting

Sample	Vol (L)	Total	Flint	Chalk	brick	>75	>50	>28	>20	>14	>10
1: (401) Spit 2	30	2340g	2330g / 95%	10 / 5%	(20)	14	16	23	20	12	15
2: (402) Spit 7	30	2265g	2241g / 99%	24 / 1%	(12)	-	24	35	13	16	12

Table 2. Clast analysis – percentage data (raw data, weights in grams, is presented in Appendix 1)

The finer clasts <10mm were fractionated into >4mm, >2mm and >1mm fractions, fully sorted under a stereo-binocular microscope and weighed (Table 3)

Sample	Vol (L)	Total	>4mm	>2mm	>1mm
1: (401) Spit 2	30	2340g	303	188	125
2: (402) Spit 7	30	2265g	424	202	136

Table 3. Clast analysis – note weights in grams (as in Appendix 1, not percentage records as in Table 2)

The presence of brick and building material debris is probably material pushed laterally into the deposits during the construction of the Ascot Arms cellar wall. All brick/building debris is excluded from the percentage calculations (Table 2). Material was evenly distributed in class size (Table 1), but the larger fractions (>28mm) were brecciated flint and the smaller elements (<28mm) were mainly fine well-rounded pebbles (Appendix 1; tables A1 & A2) typical of Tertiary deposits (ie, brickearth, Reading Beds etc.). It is clear from this that the Holocene colluvial brown earth is largely derived from soils developed on the brickearth upslope. Nether contained any archaeological artefacts (or features).

Soil micromorphology

An undisturbed soil block (12 × 8cm, kubiena sample) was taken from their 'soil' lens within the periglacial deposits (Figs 3 & 7). This was possibly a rare survival of possibly Windermere interglacial (Allerød) soil material (possibly transported, or azonal soil with minimal *in situ* pedogenesis). The soil block (K1) was taken to facilitate additional description to assist interpretation and for subsampling, but mainly for soil thin section manufacture and



soil micromorphological analysis. This was dispatched for thin section preparation (and thus creation of an archive stable samples on 3 May 2023. Preparation can take up to 6 months but provides a stable archive.

Magnetic Susceptibility profile

Soil magnetic susceptibility measurements (see Allen & Macphail 1987) were made on 11 subsamples removed from the monolith at generally 50 mm intervals to assist in the characterisation of the deposits (Allen 1986).

Magnetic susceptibility (X_o) expresses the ratio between the magnetisation induced in a sample and the magnetising field (detailed definitions are given in Thompson *et al.* 1975 and Oldfield *et al.* 1978). This enhancement is due to the conversion of iron oxides in the soil from weakly ferro-magnetic forms (eg hematite Fe_2O_3) to strongly magnetic forms such as goethite and maghemite (γFe_2O_3) which have a strong positively aligned moment if placed in a magnetic field (Longworth & Tite 1977) and are capable of retaining remanence when removed from that field. This process may be the result of pedogenic processes (see below) or burning (Clark 1983).

Magnetic susceptibility is enhanced through burning and since this is replicable in the laboratory (le Borgne 1955; 1960) the mechanisms are fairly well understood. Biological and chemical activity within soils produces 'pedogenic enhancement' through the oxidation/reduction process affecting iron as a result of organic activity. This leads to higher magnetic susceptibility in A horizons compared with subsoils. Although the mechanisms of 'pedogenic enhancement' are less well understood (Limbrej 1975, 325), both fire and biological activity result in varying oxidation/reduction conditions which lead to enhancement and thus they are the same process mineralogically. The fact that topsoils are enhanced compared with subsoils (Stott & Douglas 1982; Oldfield 1982; Peart 1982) provides a method for detecting topsoil components in colluvial deposits and buried soil horizons (Allen 1986; 1988; Allen & Macphail 1987). Analysis of magnetic susceptibility levels in conjunction with studies of soil micromorphology have heightened our understanding of the palaeo-environments (Allen & Macphail 1985; 1987), and the elements exhibiting greater enhancement are considered to be a result of human activity (cf. Wilson *et al.* 2008; Fleisher & Sulas 2015).

Thus, although magnetic susceptibility has been used to detect burning episodes attributed to human action, geographers have long demonstrated its use sediments as a palaeo-environmental indicator, allowing distinctions to be made between sediments derived from different ecological and vegetational regimes, ie, woodland, grassland and arable (Dearing *et al.* 1981; Oldfield *et al.* 1978; 1985). They have also been able to discern whether sediments are largely comprised of topsoil or subsoil components. The possibility that such interpretive statements may also be made of terrestrial sequences has been explored by Allen (1986; 1988) and Allen and Macphail (1985; 1987).

In summary therefore, magnetic susceptibility enhancement may be due, at one level, to pedogenic activity and enhanced biological activity in top soils enabling the differentiation between topsoil and subsoils (Tite & Mullins 1971; Allen 1986; Allen & Macphail 1987) and the differentiation of major vegetation types supported (Allen 1986; 1988). The principals are summarised elsewhere (eg, Allen 1986; 1988; 1990; Clark 1990). Anthropogenic activity,



such as burning also result in enhancement, but often at much greater different orders of magnitude to that created by environmental or pedogenic enhancement.

Methods

Samples were removed from cleaned undisturbed sediments in monolith tin M1. Undisturbed sediment samples were thoroughly air dried, ground in a mortar and pestle, sieved to <2mm, and 10g of each sample <2mm was retained in a 10cc azlon pot. Each sample was measured using a Bartington MS2 meter coupled to a dual frequency MS2B coil calibrated for 10cc of sample giving mass specific calculations of magnetic susceptibility for weighed, 10cm³ subsamples (English Heritage 2007, 27). Measurements were recorded at low frequency (LF), and the mean of 3 readings taken. The results (χ) are expressed in SI units m³ kg⁻¹ x10⁻⁶ in Table 4,

Results

The results from the colluvial brown earth and brickearth vary from 20 to 33 and show no pattern of enhancement or of 'spikes' in the profile (Table X). The results are consistent with the colluvial brown earth average 21 (no. = 1), upper brickearth from 40-65cm averaging 32 (no. = 3), and lower brickearth from 70 to 80cm averaging 24 (no. = 3), combe deposits average 12 (no. = 1), and putative lateglacial soil 15 (no. = 1). The base of the colluvial brown earth has moderate to low magnetic susceptibility (31) and similar to the brickearth. Lower results are present at the base of the brickearth (70-80cm), where it overlies calcareous periglacial deposits which themselves have a typically a low result (12). The putative late glacial soils has low readings suggesting this eroded or translocated silt, with little pedogenic activity other than possibly frost / thaw. This tends to confirm the colluvial brown earth is largely derived from soils developing on and in the brickearth; that there are no buried stasis or stabilisation horizons, which confirm field and laboratory visual observations.

Sample	Depth	Context	Deposit	MS
1	35cm	401	Colluvial brown earth	31
2	40cm			25
3	45cm			32
4	50cm			33
5	55cm	402		32
6	60cm		brickearth	32
7	65cm			32
8	70cm			26
9	75cm			26
10	80cm			20
11	82cm	403	Combe Deposit	12
12	-		?Lateglacial soil	15

Table 4. Magnetic susceptibility results; LF at SI m³ kg⁻¹ x10⁻⁶

Palaeo-environmental Assessment

Samples were taken for sieving to enable basic clast analysis. However, the samples were processed by KDK Archaeology Ltd by flotation, rather than sieved, so both a flot and residues were available. Flots were retained on a 0.5mm mesh and residues on 1mm.



Consequently, both clast analysis (above) and palaeo-environmental assessment were possible and undertaken.

Charred plant and charcoal remains

The flots were scanned under $\times 6.1 - \times 55$ magnification using a Leica stereo-binocular microscope. The presence of charred plant and charcoal remains was recorded in Table 5. The volumes of flot are the charred remains and modern rooty material separately, and the presence of charred remains and charcoal are recorded (Table 5), and identified land snails in Table 5. Most of the flot was considered intrusive and 'modern' (see also snails below)

Sample: Context	Vol (L)	Flot vol (ml charred / soils+roots)	Grain	Charcoal >2mm	Snails	Comment	Analysis
1: 401	30	- / 5	-	-	>10	No charred remains	-
2: 203	30	- / 10	-	-	>10	No charred remains	-

KEY: ANALYSIS, C = CHARCOAL, P = CHARRED PLANT REMAINS

Table 5. Assessment of the charred plant and charcoal remains

No charred plant or charcoal remains were present in the flots (Table 4), excepting very small unidentified fragments <2mm of charcoal, that may well be intrusive down earthworm or root voids. The fine residue (<10mm) was scanned and fully sorted using a stereo-binocular microscope and similarly no charred remains were present.

Pollen Assessment Analysis

Catherine Langdon

Eight pollen samples were provided for pollen assessment from Ascot Road, Gravesend, Kent with the aim to examine deposits for evidence of Palaeolithic activity. Samples from a 'soil' lens and brickearth were provided for initial analysis. If sub-fossil pollen and spores were present in the sediment preliminary information on the local vegetation and environment could be ascertained and any potential for additional analysis considered.

Pollen method

Due to the minerogenic nature of the sediment, much larger samples of 10ml - 15ml volume were processed using standard techniques for the extraction of the sub-fossil pollen and spores (Moore & Webb 1978; Moore *et al.* 1991).

The Pollen data

Eight samples were assessed, two from a 'soil' lens (132cm, 138cm) and six from brickearth (42cm, 50cm, 58cm, 66cm, 74cm, 82cm). Apart from a single *Betula* (birch) pollen grain in the sample at 42cm no other pollen was recorded. As such, no further work is deemed possible.

Land snails

A few land snails were present in the flots. These were fully extracted and sorted from the flots and identified (Table 4). The fine residues were fully sorted (Table 3) scanned with stereo-binocular microscope and no further shells were present.



The two small assemblages were dominated the large numbers (unquantified) of the burrowing and this palaeo-ecologically insignificant species *Cecilioides acicula*. The remaining assemblage comprised wholly open of country species (Table 4). The assemblages are too small to make and palaeo-environmental interpretation (cf. Evans 1972; Allen 2017) except to say that all species are typically open country species, and most shells show weathering typical of their presence in these weakly calcareous deposits. One shell of *Candidula* spp. was present, an Introduced Helicellid, thought to have been accidentally and inadvertently introduced to Britain in the medieval (or Roman) period (Kerney 1966). With this exception the assemblage *could* be cold stage Late Glacial or early Holocene and represent open environments and fit well with the chronology of the deposits, but similarly could be post-medieval and relate to the construction of the cellar.

	Deposit	Brickeath	Colluvial soil
Context	402	401	
Sample	2	1	
Vol (L)	30	30	
MOLLUSCA			
<i>Pupilla muscorum</i> (Linnaeus)	-	1	
<i>Vallonia</i> cf. <i>excentrica</i> Sterki	7	12	
<i>Cecilioides acicula</i> (Müller)	+++	+++	
<i>Candidula</i> spp.	1	-	
<i>Helicella itala</i> (Linnaeus)	8	2	
Taxa	3	3	
TOTAL	16	15	

Table 6. Land snails from flots of samples from the colluvial soil and brickearth

Optically Stimulated Luminescence (OSL) samples

Two OSL samples were taken from the middle and base of the brickearth (402) at 60cm and 78cm. Each sample was accompanied by a small disturbed soil sample (c. 200g) for any associated laboratory gamma spectrometry measurement or soil chemistry. These have the potential for providing a chronological framework for deposits accumulation, and thus for any accompanying palaeo-environmental record that might elucidate information about the Palaeolithic landscape history, resources (pollen) and potential for human occupation.

Unfortunately, the poor preservation of pollen (Langdon, above) and not surprisingly a lack of charcoal and charred plant remains provide no palaeo-environmental record or land-use history that requires dating. The OSL samples can provide an absolute date from this deposit which could then be compared with other sites in the Thames, and it could provide a terminus *ante quem* date (albeit very general) for the putative late Glacial Interstadial soil from the soil thin section slide is being manufactured.

Deposit Model: discussion. significance and potential

Quaternary deposits with potential for Palaeolithic (and later) artefacts, and palaeo-environmental records are well known from Kent. These include both stratified alluvial and estuarine deposits (eg, Barham *et al.* 1995; Firth 2000), superficial Quaternary deposits over



the Chalk such as loess at Pegwell Bay (Pitcher *et al.* 1954; Murton *et al.* 1998; Weir *et al.* 1971), periglacial deposits (Murton & Giles 2016; Murton *et al.* 2003; Kerney 1965), as well as those more directly associated with Palaeolithic archaeology (eg, Wenban-Smith *et al.* 2007; 2014). Recent studies have mapped these extensively across Kent providing both a spatial and chronological database for the county. Here, however, the deposits were shallow and localised.

Clay-with-Flints (*contra* Souterrain 2022) was not present, but a shallow (0.8m) stone-free superficial Head (brickearth) was present over the late glacial periglacial solifluction/gelifluction deposits (Coombe Deposits) and under a Holocene colluvial brown earth.

No artefacts were recovered from the bulk samples, nor from the searching of the spoil from the 16 × 10cm-thick machine-excavated spits.

Colluvial Brown Earth

A shallow, stone-free decalcified brown earth was present to 0.76m thick (trench 1) and was derived from soils developed in the brickearth. It was a massive slope deposit with no pedological evidence of a stasis at its base or of within the deposit. It comprised a thin veneer of colluvium over the southern (upslope/footslope) portion of the site in particular. It suggests deforestation and/or tillage resulting in accelerated hillside soil erosion probably in prehistory (cf. Bell 1983; Allen 1988; 1991; 1992).

Brickearth

The superficial deposit (labelled “Clay-with-Flints” by the field archaeologists) is not Clay-with-Flints *sensu stricto* as that is a Tertiary geological deposit (ie, Palaeogene 66-23 Mya and Neogene 23-2.5 Mya) and is a product of the solution of the chalk and the incorporation of residual material from Palaeogene deposits, mainly the Reading Formation. The deposit on site is probably Head (cf. Gallois 2009) or brickearth and should not be classified as Clay-with-Flints. If the cold stage (periglacial) deposits relate to the last Devensian glaciation, then the Head/brickearth is largely late glacial (ie, late Upper Palaeolithic to earliest Mesolithic). This Quaternary brickearth (cf. Allen & Scaife 2008; Allen 2008a; Hodgson 1976) is in ‘classic brickearth territory’ (Prof. J. Boardman pers. comm. 3/5/23), and deposits fall within the parameters described by Boardman and Hazelden (1986) for the Kent brickearths.

This deposit forms the key geoarchaeological record, and *may* provide a land-use record via preserved pollen. As the main fieldwork aims were to address the Palaeolithic human environment, and these deposits were considered to largely postdate that, it was not sampled for OSL dating in the field. Two samples were, however, taken at 60cm and 78cm at the AEA laboratory from the monolith tin (M1) for OSL dating, and Prof. P. Toms (University of Gloucester), confirmed that this type of sample is potentially suitable for dating (Toms pers. comm. 2/5/23).

Late glacial periglacial solifluction/gelifluction deposits (Coombe Deposits)

1. Stone free ‘soil’

The stone-free silty clay loam lens occurs with the Cold Stage periglacial deposits of the (presumably) last (Devensian) glaciation, c. 33,000 to 10,000 years ago. If this is a rare survival of either an *in situ* soil, or eroded soil material ie, has evidence of pedogenesis (soil



formation), then one of the few periods when soil formation occurred in the last Glaciation is during the Windermere (Allerød) Interstadial (ie, Final Late Upper Palaeolithic, 12,500-11,000BP). If it belongs to the Final Late Upper Palaeolithic period any palaeo-environmental information which would assist in determining the lived-in landscape and potential landscape resources (via pollen analysis), would be of regional (or even national) significance.

Detailed examination, however, did not show evidence of any pedogenesis or soil structure, and the fact the upper and, more importantly, the lower contact, were sharp, suggests a lack of soil formation, and the likelihood is that this is decalcified (soil) fine-grained material washed downslope and the lens latterly deformed by periglacial action (Fig. 9), or is the product of *in situ* dissolution. If, however this is a Final Late Upper Palaeolithic, Windermere (Allerød) Interstadial soil, typically 11,500-10,000 cal BC (see Allen 2008b. Table 6; Preece 1994), then it is of particular significance. The survival of such soils in southern England is rare (Allen 2008b; Preece 1992; Preece & Bridgland 1998), see Figure 10, especially if they contain long stratified palaeo-environmental sequences such as at Holywell Coombe, Kent (Kerney *et al.* 1980; Preece & Bridgland 1998), Brook, Kent (Kerney 1963; Kerney *et al.* 1964), Westhampett, West Sussex (Allen 2008b), and Burleston Down, Dorset (Allen 1999; Scaife 1999). Rarer still is associated archaeological and artefactual evidence, which has only been recovered when very large areas have been opened (ie, 45 × 10m), excavated and sieved (see Allen 2008b, Westhampnett, West Sussex). However very late glacial (long blade) sites are also known stratified in Quaternary deposits such as the important late glacial and early Mesolithic (10,500-8250 cal BC) site at Three Ways Wharf (Lewis & Rackham 2011), and in Kent, that at Underdown Lane, Herne Bay, Kent (Gardiner *et al.* 2015) and Lullingstone county park, Kent (Anderson-Wymark & Pope 2016).

Soil micromorphological analysis (combined with magnetic susceptibility profiling) will assist in confirming the origin of this deposit or soil.

2. Periglacial Combe deposits

These calcareous clastic to marl deposits have probably been best studied in Kent than anywhere else (cf. Kerney 1963; 1965; Kerney *et al.* 1964; 1980; Preece & Bridgland 1988; 1999), but rarely contain artefacts. In East Sussex attempts to sieve over 1 tonne of Combe deposits in dry valley floors in Eastbourne and outside Lewes failed to find any artefacts. However, at Woollards Field, Moulsecoomb, Brighton, East Sussex, rare Palaeolithic evidence was found during the excavation of deeply stratified periglacial deposits (Pope *et al.* 2008; 2013), indicating that these deposits cannot always be wholly discounted. Unlike those at Woollards Field, those at Ascot Road were poorly differentiated and the lower portions of both sequences (trenches 1 and 4) were largely chalk clasts that could be heavily weathered *in situ* Chalk bedrock.

Conclusions

In view of the limited depth of stratigraphy and other better stratified sites in Kent (C. Johnson pers. comm.), a limited and targeted assessment programme was recommended, and undertaken. This has largely assisted in characterising the deposit. In view of the poor palaeo-environmental presence and preservation (pollen and charred remains), and the lack of evidence for human activity, either directly or indirectly



Pollen was so poor it was not even possible to indicate if the soil lens was an Interstadial (Windermere / Allerød) or provide any information about the vegetation or climatic history for the overlying brickearth.

Magnetic Susceptibility Profiling has indicated a uniform deposits with no stasis horizons.

Soil thin section (Soil block K1) is currently made into a thin section slide thus making it archive stable. Describing and analysis of this would confirm i) the late glacial nature of the deposits and ii) the presence of any soil formation.

OSL samples: No further work is proposed on either the two OSL samples (60cm and 78cm), but these should be retained until completion of the assessment and their value reviewed then.

Land snails: full analysis completed, no further work

Recommendations

1. As the soil thin section is being manufactured, soil thin section (soil micromorphology) analysis and reporting should be completed, thus completing the archive record.
2. All sorted residues have been discarded, the OSL samples should also be discarded.
The

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Authors

Dr Michael J. Allen
Allen Environmental Archaeology,
Redroof, Green Road,
Codford, Warminster,
Wiltshire, BA12 0NW

Dr Catherine Langdon
Visiting Research Fellow in Palaeoecology
School of Geography and Environmental
Science
University of Southampton
Southampton, S017 1



APPENDX 1 CLAST DATA

<i>Sample</i>	<i>Vol (L)</i>	<i>Total</i>	<i>Flint</i>	<i>Chalk</i>	<i>brick</i>	<i>>75</i>	<i>>50</i>	<i>>28</i>	<i>>20</i>	<i>>14</i>	<i>>10</i>
1: Spit 2	30	2340	2330	10	(46)	338	369	533	472	287	341
2: Spit 7	30	2265	2241	24	(273)	-	537	788	292	368	280

Table A1. Clast analysis – raw data (weights in grams)

	<i>Brecciated flint</i>	<i>Flint pebble</i>	<i>Chalk</i>	<i>Brick etc.</i>	<i>Total</i>
Sample 1 (401)					
75mm	338	-	-	-	338
50mm	369	-	-	-	369
28mm	533	-	-	-	533
20mm	334	138	-	(8)	472
14mm	181	102	4	(25)	287
10mm	227	108	6	(13)	341
Total	1982	348	10	(46)	2340
Sample 2 (402)					
75mm	-	-	-	-	-
50mm	537	-	-	-	537
28mm	695	85	-	(29)	780
20mm	247	45	8	(232)	300
14mm	224	144	-	(3)	368
10mm	105	159	16	(9)	280
Total	1808	433	24	(273)	2265

Table A2. Full sample data (coarse clasts) by clast type (weights in grams)

<i>Sample</i>	<i>Vol (L)</i>	<i>Total</i>	<i>>4mm</i>	<i>>2mm</i>	<i>>1mm</i>
1: (401) Spit 2	30	2340g	303	188	125
2: (402) Spit 7	30	2265g	424	202	136

Table A3. Clast analysis – note weights in grams

Michael J. Allen

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Figure 1. Location of geoarchaeological trenches in blue. Image from KDK Archaeology

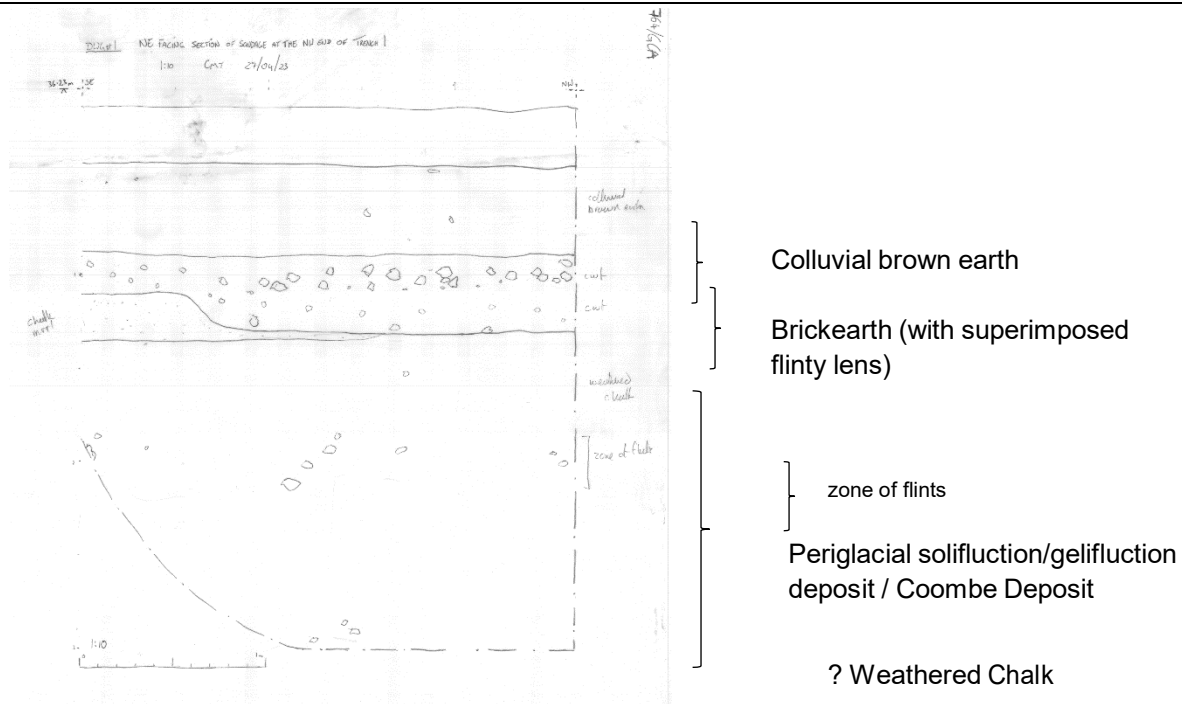


Figure 2. Trench 1; Field section drawing (KDK Archaeology Ltd.)

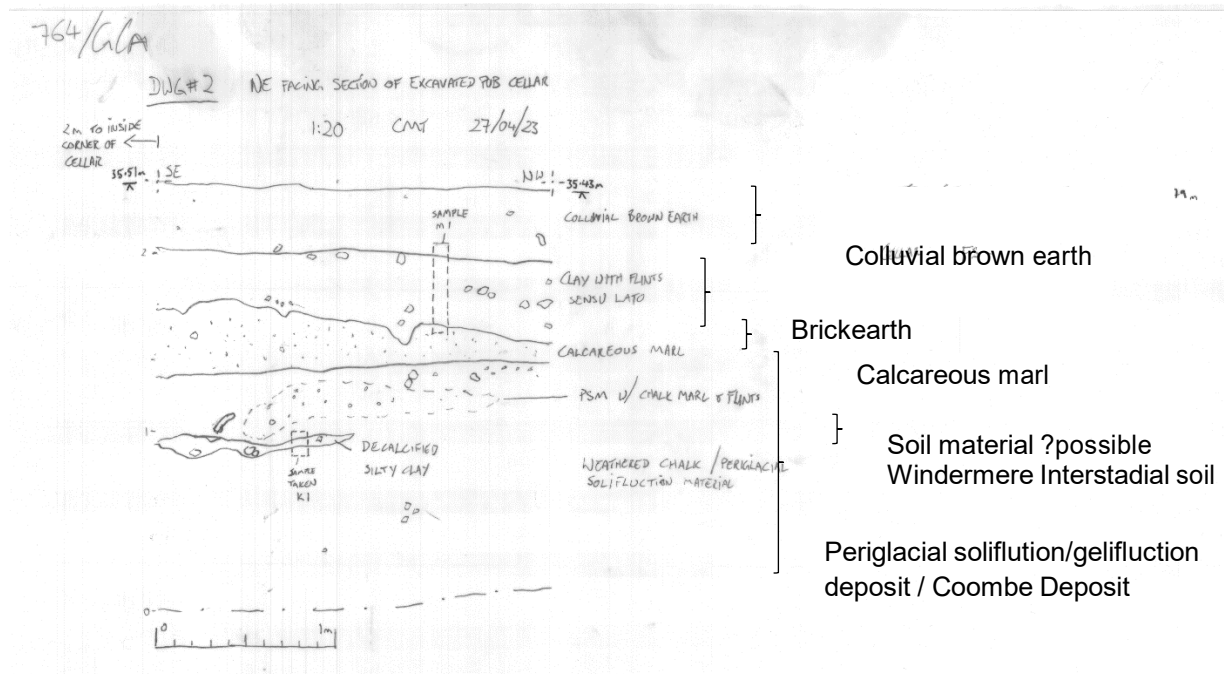


Figure 3. Trench 4; Field section drawing (KDK Archaeology Ltd)

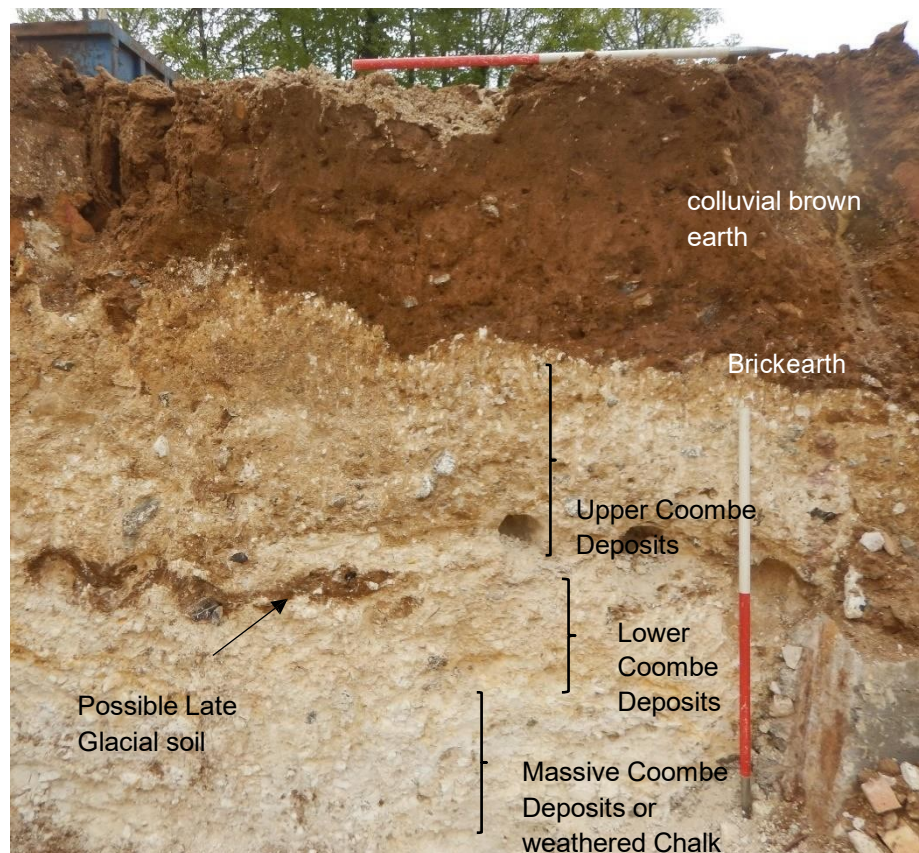


Figure 4. Trench 4: left, the section; Right, machine excavated trench through the colluvial soil and brickearth. Image © M.J. Allen 2023



Figure 5. Trench 4: Left Monolith 1 (M1) and Above, soil block sample (K1). Images © M.J. Allen 2023



Figure 6. Monolith M1, base of the colluvial brown earth (lost) and brickearth. Top is to the left. Image © M.J. Allen



Figure 7. Soil block sample Kubiena K1; of the possible soil within the Coombe Deposits. Top is to the top. Image © M.J. Allen

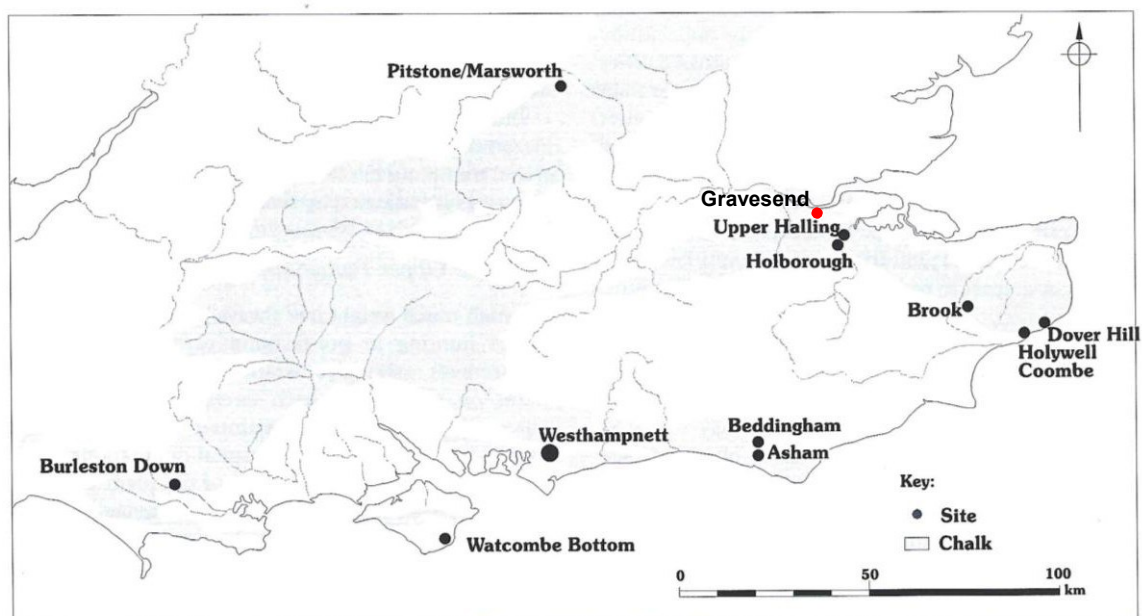


Figure 8. Location of some key Allerød soils in southern England; from Allen 2008, fig. 21



APPENDIX

<i>Trench ; deposit</i>	<i>Context</i>	<i>Sample</i>	<i>vol proc / taken (litres)</i>	<i>Flot vol (ml) charred / soil+roots</i>	<i>grain</i>	<i>legume, pea, lentil</i>	<i>weed seeds /chaff</i>	<i>charcoal >4mm pieces</i>	<i>charcoal >2mm (ml)</i>	<i>Notes</i>	<i>Analysis</i>
colluvial brown earth	401	1	30 / 30	3 / 3	-	-	- / -	-	-	Few fine comminuted charcoal >2mm, modern plant material (roots) and some snail shells, (predominately <i>C. acicula</i>)	
Clay with flints / brickearth	301	2	30 / 30	5 / 1	-	-	- / -	-	-	Few fine comminuted charcoal >2mm, modern plant material (roots) and some snail shells, (predominately <i>C. acicula</i>)	

KEY: A*** = > 75; A** = >20; A=10-20; B= 5-9; C= 1-5. + = PRESENT; LW = LARGE WOOD; RW = ROUNDWOOD ANALYSIS: C = CHARCOAL; P = CHARRED PLANT REMAINS, C¹⁴

Appendix. Detailed assessment of charred plant and charcoal remains from Ascott Road, Gravesend, Kent (746/GCA)



