APPENDIX 1 - GEOARCHAEOLOGY

1.1 Assessment of the Geoarchaeology

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Introduction

1.1.1 Investigation of the geoarchaeology of the exposed sequences involved visits to the site to either i) log sequences and advise on procedures for sediment and soil micromorphology sampling and, where appropriate, advise field staff on the recording of sequences exposed during excavation or ii) provide verbal comment on exposed sections.

1.1.2 Where section logging was required standard geological terminology was used to record sequences (see Methodology below). As part of this work a number of samples were recovered to allow for further specialised investigation, if required.

1.1.3 The assessment was undertaken in accordance with the Fieldwork Event Aims (see section 2, main report), in particular 1, 4-5. The aims and objectives of the geoarchaeological input to this phase of works focussed on identifying and interpreting stratigraphy and buried soil horizons within contexts associated in late-glacial environments (as previously identified by Wessex Archaeology within the area (URL 1997b).

Methodology

1.1.4 This report focuses on the description and interpretation of three sequences revealed during the course of archaeological investigation of the Nashenden Valley area. Detailed profile descriptions and interpretations are presented for two investigation sequences recorded in evaluation trenches 3113TT and 3123TT (Little Monk Wood ARC MON 98). Comment is also made on the sequence of deposits revealed during the course of excavation of a major trench at ARC NSH 98.

1.1.5 Sequences were recorded down-profile using standard geological terminology used in Quaternary science (Jones *et al*. 1999). All measurements on sequences are given relative to the top of the profile.

Quantifications

1.1.6 Three profiles were examined as part of this assessment. Profile descriptions for evaluation trenches 3113TT and 3123TT are presented in Tables 6.2a-2b.

1.1.7 The profile recorded in 3123TT (Table 6.2a) produced a sequence of Pleistocene and Holocene sediments recorded to a depth of 3 m below the ground surface. Two possible palaeosol horizons were identified in this sequence at depths of 0.94 m and 2.2 m below ground surface. An important break in deposition (an unconformity) was identified at 1.48 m depth and this boundary separated the Pleistocene from Holocene sediments.

1.1.8 The lowermost buried soil horizon (at 2.2 m depth) was sampled with a single kubiena tin across the sequence boundary to provide a sample of the possible pedogenic horizon. This horizon lies within a sequence of sediments interpreted as cold climate solifluction deposits and may represent the late-glacial (or Allerød) soil horizon that has been widely reported in south east England (Kerney 1963; Preece, 1998). A similar horizon was tentatively identified in previous investigations of this part of the route corridor (URL 1997b). The buried soil horizon within the overlying

colluvium (at a depth of 0.94 m) is typical of soil horizons buried in sediments derived from slope wash processes and is likely to date to the Bronze Age or later (see similar examples in Preece 1992; Preece and Bridgland 1998).

1.1.9 The profile recorded in 3113TT (Table 8.2b) did not reveal any sediments likely to relate to the buried soil horizons seen in 3123TT. A typical Holocene colluvial sequence was identified to a depth of 1.05 m. Coarser flint and chalk rich gravels lay below this deposit. The status of the sediment between 1.05 m and 1.8 m depth remains equivocal and cold climate solifluction processes or colluvial processes eroding older Pleistocene sediments may have been responsible for the deposition of this unit.

1.1.10 A more extensive sequence of valley side deposits were exposed in excavations at ARC NSH 98. This trench was excavated at the location of the previous evaluation trench 1497TT (URL 1997b). Two major sections were drawn and described through these deposits. Similarities exist between these profiles and that described in 3123TT (see Table 6.2a). A complex series of deposits were noted to exist beneath the topsoil lying parallel to the modern ground surface (contexts 5001-5006). Bulk samples were taken from these units (Table 6.1).

Table 8.1: Context numbers and sample details: ARC NSH98

Context	Samples
5003	7001/7014 7002/7015
5004	7003/7016 7004/7017
5005	7005/7018 7006/7019 7007/7020 7008/7021 7009/7022
5006	7010/7023 7011/7024 7012/7025 7013/7026

1.1.11 The sediments are typical of valley side colluvial deposits of Holocene date, similar to those noted in 3123TT (0.00 – 1.48 m) and 3113TT (0.00 – 1.05 m) Tables 6.2a-b.

1.1.12 Sediments assigned to context numbers 5007-5008[1] appear to exhibit a sub-horizontal appearance and consist of a sequence of units containing variable quantities of gravel (both chalk and flint rich). Considerable complexity was noted within these units (see sub-divisions 1-9, context 5008). No samples were recovered from these units. These deposits are likely to date to the late Pleistocene and have been deposited by solifluction processes under cold climate conditions. No unequivocal evidence is present within these profiles to indicate the presence of a buried late glacial soil horizon similar to that noted elsewhere in Kent (Kerney 1963; Preece 1992; 1998; Preece and Bridgland, 1998) although the time interval within which this soil developed may be present within the profile. The absence of diagnostic traits makes it difficult to determine its position within the sedimentary profile.

[1] Context 5006 probably forms part of the late-glacial complex of sediments but may be a sediment reworked from the valley solifluction deposits either late in the Pleistocene or early in the Holocene.

Table 8.2. Profile descriptions: ARC 3123TT and 3113TT

a) 3123TT

Depth (metres) below ground surface	Stratigraphic description	Inferred processes of deposition
0.00 – 0.36	Mid to dark grey silt. Structureless and unconsolidated. Common modern rootlets, angular to rounded flint clasts (20-50 mm diameter). Common chalk clasts (5-10 mm).	Topsoil
	---diffuse contact---	
0.36 – 0.94	Reddish-brown silt. Homogenous, massive and structureless. Common modern roots and large empty root canals (5-10 mm). Occasional angular flint clasts (<50 mm) and occasional chalk clasts (5 mm). Chalk clasts increase in frequency with depth. Unit is dense and compact.	Holocene colluvium
	---abrupt contact---	
0.94 – 1.26	Very dark reddish-brown silt. Unit is similar to above but fewer chalk clasts than above.	Holocene colluvium with a possible buried soil developed in the upper part of the colluvium.
	---diffuse contact---	
1.26 – 1.48	Reddish-brown silt with very common to abundant small chalk clasts (<10 mm). Very rare flint clasts.	Holocene colluvium
	---sharp contact---	
1.48 – 1.52	Pale brown chalk pellet gravel.	Periglacial slope wash.
	---abrupt contact---	
1.52 – 1.65	Pale brown silt with common very small chalk clasts (1-2 mm). Structureless, massive and relatively loose.	Periglacial reworked loess.
	---abrupt contact---	
1.65 – 2.20	Very pale brown clast supported chalk pellet gravel interbedded with thin discontinuous beds of light brown silts (20-50 mm thick). Clasts are 20-40 mm near base and fine upwards to <1cm. Matrix is silt where present.	Periglacial slope wash gravels.
	---abrupt contact---	
2.20 – 2.60	Clast supported flint gravel at base becoming matrix supported upwards. Clasts are poorly sorted, <30 mm to >120 mm and typically angular. Smaller (10 mm) rounded to sub-rounded chalk clasts are common. Upper part of unit contains dark brown silt matrix with many smaller (<10 mm) chalk clasts. Unit is loose and unconsolidated. Common small, discontinuous carbonate tubules are present in the upper part of the unit.	Solifluction deposit with a pedogenic horizon in the upper part of sequence.
	---abrupt contact---	
2.60 – 2.84	White matrix supported chalk gravel with occasional flint clasts. Coarsens upwards. Clasts are 20-60 mm. Flint content also increases upwards. Dense and compact, structureless.	Solifluction deposit.
	---diffuse contact---	
2.84 -	White chalk gravel with chalky silt matrix . Matrix supported. Very dense and compact. Chalk clasts are angular (10-60 mm) . No observed flint. Structureless.	Solifluction deposit.
	---base of profile 3.00 m---	

b) 3113TT

Depth (metres) below ground surface	Stratigraphic description	Inferred processes of deposition
0.00 – 0.25	Mid greyish-brown silt. Modern roots and common. Occasional angular flint clasts. Structureless and loose.	Topsoil.
	---abrupt contact---	
0.25 – 1.05	Reddish-brown silt. Structureless and massive. Occasional angular flint clasts (20-50 mm). Occasional small (<10 mm) angular chalk clasts. Modern roots penetrate throughout unit.	Holocene colluvium.
	---undulating/abrupt contact---	
1.05 – 1.80	Reddish-brown to very dark reddish brown clast supported flint gravel. Gravel is very poorly sorted (20->100 mm) and clasts are angular. Matrix composed of silt. Occasional chalk clasts present. Structureless and massive.	Solifluction deposit or coarse colluvium
	---undulating/abrupt contact---	
1.80 -	Yellow to whitish-yellow chalk gravel. Clasts composed of flint and chalk (clasts<150 mm). Matrix is silt. Structureless and massive. Dense and compact.	Solifluction deposit.
	---base of trench 2.10m---	

Provenance

1.1.13 The stratigraphy present within the three trenches examined is representative of well known sequences that are better preserved elsewhere in Kent. The contexts described falls into two groups of sequences:

1: A lowermost group of deposits dominated by coarse flint and chalk rich gravels (that may contain evidence of a weathering horizon or soil development, e.g. in ARC 3123TT) deposited during the late Pleistocene under typically cold climate conditions (the exception to this is the buried soil horizon that would have developed under milder conditions during the late glacial interstadial 11-12ka BP);

2: An upper group of silts deposited by hillwash processes during the later part of the Holocene.

Conservation

1.1.14 Only one undisturbed sediment sample exists from these trenches (a kubiena tin for soil micromorphological analysis) from the lowermost potential pedogenic horizon in 3123TT. Desiccation of this sample will occur over time. Investigation of the soil micromorphological properties of this sample could be undertaken and this would necessitate impregnation of the sample, rendering it inappropriate for any other forms of investigation. Impregnation and preparation of a thin section through this deposit would provide a stable, long-term archive record of the nature of the buried soil horizon at this site.

Comparative material

1.1.15 Comparable material to the sedimentary units identified during the fieldwork exists at a number of locations within the CTRL corridor and beyond within southern England. Extensive sequences of late glacial and Holocene sedimentary units exist and have been the subject of assessment from the White Horse Stone and West of Boarley Farm sites to the east of Nashenden Valley within the CTRL corridor. Late Pleistocene and Holocene slope deposits have also been encountered within the Ebbsfleet Valley evaluation works (URL 1997a). Within the Medway Valley the late glacial soil horizon is well known from Upper Halling (Kerney 1963; Preece 1998) and a well dated sequence of late glacial/Holocene deposits were investigated at the site of the Channel Tunnel portal at Holywell Coombe (Preece and Bridgland 1998).

Potential for further work

1.1.16 The investigation was intended to focus on the potential of these sites for revealing new data regarding the nature of late glacial/early Holocene palaeoenvironmental change contemporary with the earliest stages of the recolonization of Britain by plants, animals and importantly humans at the end of the last cold phase. Despite the presence of sediments clearly associated with this final phase of the Pleistocene, well stratified sequences containing fossiliferous material dating to the late glacial period were not encountered in any of the sections recorded. In comparison to other sites along the CTRL (eg White Horse Stone and the Ebbsfleet Valley) the sections in Nashenden Valley do not add materially to our present understanding of the sequence of changes during the late Pleistocene/early Holocene transitional phase. Only a single kubiena tin was recovered from these horizons that could potentially be impregnated and examined or held as archive pending future investigation.

1.1.17 The samples through the overlying colluvial sequence from ARC NSH 98 provide a focus for investigations of Holocene or later Prehistoric landscape change. However, a near absence of archaeological material and environmental indicators suggests that the sequence has generally low potential for any further analysis.

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