Channel Tunnel Rail Link

London and Continental Railways

Oxford Wessex Archaeology Joint Venture

Geoarchaeological recording at Whitehill Road (CTRL Zones 1 and 2), Southfleet, Kent

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1 INTRODUCTION

Monolith samples were taken through valley-side sediments on the NNE facing slope of the dry valley. They were taken from two sections (26 and 23), which cut through a sequence of sediments that were interpreted as soliflucted and colluvial slope deposits, eroded from the surrounding higher land and accumulated in the valley floor area of the site during the Pleistocene and Holocene periods of the Quaternary. The monoliths were described and illustrated during the assessment stage of the project according to the geoarchaeological methodology designed for the route-wide scheme. Although no work beyond geoarchaeological description of the monoliths has been undertaken, a summary of the assessment results is given here. The locations of the monolith samples discussed in this report are shown on Figure 4 of the site report (Bull 2006).

2 DISCUSSION OF RESULTS

The dry valley sampled belongs to one of the dry valley systems draining northwards off the North Downs. It drains into the Ebbsfleet Valley and lies about 2km west of the dry valleys sampled in the Northumberland Bottom area, at ARC TGW97 and ARC TLG98.

Sample {26} was taken from section 23 and was located further up the slope and close to the depression of a tributary channel, joining the dry valley from the south-east. Sample {24} was located about 40m NW of sample {26} (both down-valley and down-slope) and taken from the SW end of section 26 and. Sample {25} was taken from the NE end of section 26, from a slightly lower elevation and about 30m closer to the valley axis than sample {24}.

Gravelly 'Head' deposits were recorded at the base of the sequence, but were not sampled. This poorly sorted chalk rich material is likely to have sludged downslope over a still frozen subsoil during periods of seasonal melt at some time following the Last Glacial Maximum (that is, after 18ka BP).

Above the Head, bedded sand, silt, chalk and flint granules were recorded as context [003] in {26} and lower part of [86] in {24} (Bull 2006, Fig. 4). These deposits are likely to represent material transported down the valley side and down the axis of the valley as a result of melt-water and run-off in the late Devensian. A gradual interface was recorded between these bedded waterlain deposits and a loessic deposit, siltier and with fainter clayey laminations than the underlying bedded sands and chalk pellets of [3]. The loess, or redeposited loess accumulated on the valley side as context [2] in {26} and the upper part of [86] in {24}. The gradual interface suggests that the deposition of the Loess may have formed a continuous depositional event with the waterlain deposits it overlies.

Loess is essentially windblown silt (Lowe & Walker 1999, 121) and its deposition has been dated from about 25ka to 10ka BP in this area (Bateman 1998).

Recent micromorphological examination of inter-laminated silt and sand in part of a loess / brickearth profile at Heathrow airport, has shown that wind blown sedimentation was likely to have occurred in winter and surface wash during the summer months (Rose *et al* 2000). Similar laminations are common in loess profiles within the Belgium Loess and it is likely that the faint bedding within the Loess has a similar origin in the ARCSTP99 dry valley.

Loess is typically 10% carbonate, 15% clay minerals and 75% quartz (R.Langhor, pers. comm.). Contexts ([2] and [86]) had a calcareous matrix and were enriched with carbonate precipitations, particularly as root pseudomorphs. The calcareous matrix suggests that these contexts have been at sufficient depth since they were deposited, to not become decalcified. This is echoed by the carbonate precipitations, which also imply that carbonate has been leached from the formerly calcareous upper horizons of the deposit and percolated down the profile. The precipitation around root channels suggests that plants were growing in the deposit, implying that it formed the lower horizons of a soil. It is therefore likely that contexts ([2] and [86]) represent the lower part of a former loess derived deposit in which weathering and soil formation has taken place.

These processes would have decalcified the surface of the loess and rendered it susceptible to soil erosion. Human activity, especially deforestation and clearance on the plateau and slopes of the dry valley may have triggered hillwash processes, which appear to have eroded the upper decalcified loess and soil from the valley sides and redeposited it further downslope as colluvium. The colluvium comprised three contexts (see Figure xy), which infilled the valley floor and lower valley side: [85] and [1] further upslope; [84]; and [87]. Each colluvial deposit became thicker downslope, towards the foot of the valley side and across the valley floor and this, together with the inclusion of apparantly rolled and compacted soil clasts in context ([1]) would support the colluvial interpretation for the decalcified deposits forming the upper part of the sequences sampled. Although all three colluvial contexts were yellowish brown clay silts and difficult to differentiate, the lowest (‘primary colluvium’) had occasional gravel (contexts [85] and [1]); the middle (‘secondary colluvium’) was more clayey with very few inclusions (context [84]); and the upper colluvium was characterised by frequent chalk flecks and fragments (context [87]). The accumulation of the colluvium may have been a continual and gradual process, as no bands of coarser material or visible eroded surfaces exist. Material found during the evaluation stage of fieldwork (Wessex Archaeology 1997) dated the earliest colluvial episode to the Bronze Age.

Wetter conditions seem to have existed on the floor of the dry valley, perhaps as a result of the seepage of springs from the valley side. The more clayey colluvium ([84]) in this area was characterised by manganese flecks and occasional iron staining and it is possible that here episodically flooded conditions pertained. Past hillwash events are likely to have deposited coarser sandy sediment at the valley edge but carried finer particles into the axis of the valley. Seasonal bournes were also likely to have existed in the valley in the past. However the lack of coarser material implies that during these episodes the valley floor may have been flooded or soggy as opposed to containing flowing water.

The generally well-sorted fine texture and lack of flint and chalk gravel lenses within the colluvial deposits differs from the poorly sorted calcareous valley sediments seen in many downland dry valleys (for axample at ARC-CXT97). This is probably a result of the finer grained source material available, but may also be caused by different types of colluvial processes operating. It would appear that on the present site a continuous process of surface wash has operated, together with soil creep, as there is no evidence for the coarser sediments that accumulate at the foot of rills or gulleys.

The name and location of 'Springhead' Roman settlement, down-valley from the site indicates that springs are likely to have existed in the valley in the past. The water table oscillates rapidly in chalk in response to winter rains and summer drought (Sumbler 1996, 148). As a result, spring heads of seasonal streams move up and down the valley depending on the water level in the chalk aquifer. Thus springs may have seeped from a number of places at the contact of the alluvium / colluvium and chalk after heavy rains. Although it is probable that at various times in the past fluctuating climatic conditions would have caused the water table to be higher and springs to seep more regularly across a wetter valley floor, the lack of dating evidence gives little scope for investigating relationships between deposit characteristics and climate change (or human activities).

It is possible that the many shallow sub-rounded features excavated below the colluvium (generally cut into [2] and [86] and sealed by [1] and [85]) were springs. However, as the SW valley side, on which this report is based, is mantled by a thick covering of slope deposits, it is perhaps more likely that the springs may have emerged on the NW valley side where chalk exists close to the surface. Thus it is possible that the 'spring' features are archaeological (despite their lack of finds) and have been truncated by downslope soil movement. The cuts of all the features are only visible in the carbonate-concreted parts of the profile (that is, contexts [2] and [86]). These contexts are more cohesive and less susceptible to erosion than the overlying sandier decalcified sediments. Valley side sediments are only 'in transit'. The valley sides are likely to have been both a source and a zone of accumulation of sediment (Allen 1992). Therefore it is very likely that features originally cut through decalcified soil material mantling the slope and into the *in situ* loess-derived calcareous subsoil, will eventually be reworked and eroded, leaving only the lower part, cut into the less erodible subsoil, surviving.

A distinct change in colluviation is indicated by the inclusions of chalk fragments in the uppermost deposit ([87]). This might suggest that at this time activity was focused on the chalk slope to the NE of the valley, as opposed to the SW slope, which is capped with Thanet Sand and mantled in loessic material and which was probably the source of the earlier erosion events (and activity). It is possible that this later erosion may have been associated with the use of the Roman cemetery in the Pepper Hill area. Alternatively the chalk clasts in the uppermost colluvial context ([87]) may be the result of marling (chalk added to the soil to increase its fertility) and deeper ploughing in the medieval and later periods.

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