Channel Tunnel Rail Link

London and Continental Railways

Oxford Wessex Archaeology Joint Venture

Geoarchaeological recording at Parsonage Farm, Westwell, Kent

by Jane Corcoran

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1 INTRODUCTION

Monolith samples were examined from various features on the site, including a relict stream channel (associated with a brushwood structure) and the moat of the manor complex. The monoliths were described and illustrated during the assessment stage of the project according to the geoarchaeological methodology designed for the route-wide scheme, but two of the sampled sequences were re-examined during analysis, when sampling for microfossils was undertaken. Although no work beyond geoarchaeological description of the monoliths associated with the brushwood structure has been undertaken, a summary of the assessment results is given here. Pollen and diatom assessment of sub-samples taken from the moat fills was undertaken during the analysis stage and the results have been able to refine the initial geoarchaeological assessment of the moat characteristics. The updated results are discussed in this report.

The diatom and pollen assessments were carried out according to the relevant sections of the geoarchaeological methodology designed for the route-wide scheme by Dr Nigel Cameron (UCL) and Dr Rob Scaife (Southampton) respectively and the original microfossil reports (Cameron 2006; Scaife 2006) are held with the site archive. The locations of the monolith samples discussed in this report are shown on Figure 3 of the site report (Hill 2006).

2 DISCUSSION OF RESULTS

2.1 Relict Stream Channel

The western valley floor is likely to have contained a meandering river or stream(s) in the later prehistoric period, if not later. The stream channels appear to have migrated across the valley floor, causing deposits characteristic of flowing water, standing-water and vegetated relatively dry land surfaces to be interspersed through the profiles.

The lowest deposits are fluvial sands and gravel (context [270]). These are of unknown age but are likely to represent fast flowing water carrying a coarse bed-load, derived from the Folkestone Beds of the Lower Greensand Greensand, Gault Clay and Clay with Flints of the North Downs and the Weald. The uppermost part of this context appears to be gravelly, implying that a lag deposit exists, from which the fines have been winnowed, during an episode of faster water flow. It is therefore likely that during the early part of the sequence this part of the site lay within the channel of the western stream, when the sand was deposited as in-channel bars or as point bars on the inside of meander beds.

A gradual transition to the peat of context [247], associated with the lower cut timber, suggests channel migration away from the monolith location and the development of vegetation on the channel bars. Lenses of humic clay-silt within the lowest peat deposits

([242]) indicate that flooding or pools of standing water may have existed within a possibly wooded valley floor at this time. However, the higher incidence of sandy lenses within the upper peat in context [227], associated with the upper cut timber, implies that water was subsequently flowing across the wooded or vegetated valley floor, perhaps in episodic events. This may indicate that the main water flow was migrating back towards the sample location, or else that increased water was flowing down the valley at this time.

It is not entirely clear whether the peat represents *in-situ* plant growth and decay, or an accumulation of wood, carried to this location by human and water transport. A combination of both is possible, as rooting certainly extended from, or through, context [247] into the underlying sand and the sandy lenses within context [227] suggest localised water flow in a channel-edge location.

Thus the cut timber in context [247] appears to correspond to the initial period of plant growth on the sand bar and the timber in context [227] to a renewed period of water flow across it. However, the time period between these two events is not known. They could be almost contemporary, or be separated by decades or centuries. It is also possible that the two timber layers represent the construction, [247], and later abandonment, [227], of a riverine structure.

The overlying context ([183]) was a humic silt and may represent the gradual inundation of the vegetated peat surface by minerogenic sediment, derived either from sluggish floodwater (ie: from the river) or else from surface wash and slope processes, given its valley edge location. The organic deposits were subsequently buried by increasingly coarse-grained minerogenic sediments (context [292]).

The upper part of the profile sampled might therefore be interpreted as channel migration back to the sampling location. This is supported by the lense-shaped morphology of the overlying deposits, which include the gravels in contexts [298] and [291]. These deposits indicate that relatively fast-flowing channels subsequently cut through the earlier peat deposits in this part of the valley. This may have occurred as a result of increased water flow through the valley, channel migration or hillwash processes. Slope deposits transported by water or gravity in rills and gulleys flowing into the valley might also have eroded the peat and accumulated fans of gravel.

The changes in the fluvial regime discussed above may be the direct, or indirect, result of human activity on-site or further upstream. Deforestation and agriculture increase surface run-off and expose soils to erosion. The sediment sequence indicates that water flux and sediment load has changed through time. Later deposition (context [292]) tends to have been silty, whereas the earlier river flow was 'cleaner', merely removing fines from the underlying gravels and depositing reworked sand. If the origin of the more silty context [292] is colluvial then it is likely to indicate activity on the valley-side, directly adjacent to the stream (see for example Allen 1992; Wilkinson 2003).

2.2 Medieval Moat

2.2.1 Phase 2

Monolith sample {43} was taken through the 13th century moat fills. In this phase it appears that the moat did not extend completely around the manor house but existed only on its southern and eastern sides, following the confluence of the western and eastern streams. The fills sampled were well sealed by a later (Phase 3) room, providing good chronological control.

Although 13 sub-samples were processed for diatoms they were found to be absent from the sequence. This was considered to be the result of taphonomic processes, such as silica dissolution caused by high sediment alkalinity or prolonged dry periods (see Flower 1993). Pollen preservation was also found to be poor in the 4 sub-samples examined (for locations see Hill 2006, Fig. 3), which may also result from alkaline conditions. High alkalinity could be caused by the local bedrock. Past erosion has planed the pre-Quaternary bedrock to exposed a sequence of progressively older rocks from the North Downs southwards, across the Weald (BGS Solid and Drift Sheet 289 Canterbury). The Chalk outcrops as the North Downs and the Gault Clay to the south and Folkestone Beds (part of the Lower Greensand) on the site itself are all carbonate rich, (especially the Gault Clay and the Chalk), suggesting that the water flowing through the east stream was likely to be of high alkalinity.

Gravelly sand ([1093]) was recorded at the base of the monolith sequence and the irregular surface of the sand formed the cut for the moat. The sand was humic in its upper part and, whilst this may be associated with trampling and disturbance during moat construction, iron-stained root channels suggest that vegetation had formerly grown at its surface. The gravelly sand had probably formed channel or point bars within the east stream and become vegetated as river level fell or the main thread of the stream migrated eastwards. The whitish fine-grained sand is likely to be reworked from the Folkestone Beds, which are shown on the (BGS Solid and Drift Sheet 289 Canterbury) to outcrop in the vicinity of the site.

The sandy clay silts (contexts [1066] and [1065]) above the sand accumulated within the moat. They probably represent (permanent or more likely episodic) sluggish standing water with inwash of soil material from the surrounding surfaces and upstream. Sandy lenses increase up the profile (that is, in [1065]) suggesting more water activity, disturbance to the moat fills or inwash, through time. Although no diatoms were preserved, the pollen in context [1066] indicates a local environment of grasses (Poaceae), oak (*Quercus)* and hazel (*Corylus avellana*) with cereals (which could be derived from inputs of faecal material). There is a trend into context [1065] for a decrease in oak and grasses and expansion of alder (*Alnus*), which may have been growing at the fringes of the moat itself. Rare occurrences of holly (*Ilex aquifolium*) and lime (*Tilia*) were also note in the context [1065] samples.

The pollen and sediment data suggest increasingly wet conditions on the valley floor during the period the Phase 2 moat lay open. An increase upwards in the pollen of dandelions (Lactucoideae) and undifferentiated/degraded pollen might suggest an increase in inputs of eroded soil material into the moat through time. This would suggest an increase in surface run-off from the surrounding valley sides, which is supported by the increase in sand lenses seen in the sediments. Thus it is possible that the decrease in oak in context [1065] reflects tree felling, which may have caused increased run-off and wetter conditions on the valley floor.

There are few marsh and no aquatic taxa present in the pollen assemblages; and plant macrofossil preservation was poor in samples taken from the moat fills (Anne Davis pers. comm.). This suggests that the moat in the Phase 2 period may not have contained a body of standing water at all. Frequent iron staining within the sediment matrix and as concretions suggest episodic drying out and it is likely that the moat may have been an episodically flooded ditch-like feature that became wetter, or more regularly flooded, through time, perhaps in response to targeted woodland clearance. The bulk of the sediment accumulation may have been through hillwash and episodic flooding when the fine-grained colluvial sediment represented by contexts [1065] and [1066] accumulated.

2.2.2 Phase 3

Monolith samples {38} and {39} were taken through deposits thought to represent the final phase of the moat and also extended into the former alluvial stratigraphy into which the moat had been cut. The monoliths were not taken through the primary fills of the moat, but through a sequence of deliberately laid or fluvially deposited humic and gravelly layers or lenses that appear to seal the former moat fills and level-up the landsurface. Nine sub-samples were processed for diatoms but only the two uppermost samples (from contexts [716] and [720]) were found to contain diatom assemblages and diatoms were absent from the seven remaining samples (from context [830]). Similar preservational characteristics were noted in the processed pollen samples. Of the four samples assessed, pollen preservation was excellent in the uppermost two samples (in this case from contexts [719] and [721]), but only derived palymorphs were present in the samples from context [830].

Context [830] consitsted of slanting sub-parallel beds, each about 0.10m thick, of yellowish green sand and blue grey silty clay. The context was recorded across most of the eastern stream valley and predates all the cut features in this area. Although interpreted at assessment as Holocene channel fills of the east stream, the pollen assemblages and lack of diatoms suggest it is of much earlier date. It contained substantial numbers of derived Lower Cretaceous palymorphs (pollen of geological age, including degraded saccate pollen of conifers and trilete spores of filicales). But better preserved Abies, *Picea* and *Pinus* type pollen (that is, coniferous species: fir, spruce and pine) were also present, which is probably of Quaternary date. Although *Pinus* would be expected in early Holocene deposits, Fir and spruce were present during earlier Quaternary warm stages (interglacials and interstadials) but were absent from lowland Britain during the Holocene until they were re-introduced during the post-medieval period. Thus it is likely that [830] accumulated at some time in the Quaternary, through erosion of local Cretaceous bedrock and its deposition by fluvial processes within the valley of the east stream. The upper part of [830] was iron stained and contained frequent woody roots, truncated by the moat cut ([726]), suggesting it had formed the subsoil for a vegetated landsurface before the Phase 3 moat was dug.

The truncated surface of [830] was overlain, at the sampling location, by gravel beds ([721] and [720]) interleaved with a lense of humic sandy silt ([741]). Although in section these deposits appear to represent a deliberately laid surface, sealing an earlier phase of the moat, which dips down to the east of the sample location, the good preservation of microfossils and, in particular, the presence of properly aquatic diatoms suggests that the gravel may have acted as a clean floor for a later phase or function of the moat.

The diatoms present in [716] and [720] are non-planktonic species. These diatoms live attached to submerged surfaces such as the leaves of aquatic macrophytes, or they are benthic diatoms that live within the surface of submerged mud. The species present include *Cocconeis placentula, Amphora veneta, Fragilaria construens* var. *binodis, Fragilaria construens* var. *venter, Navicula* spp. and *Pinnularia* sp. (*including P. abaujensis*). The absence of planktonic diatoms, along with the abundance of attached or benthic species which, if the water was clear may have been able to colonise the whole of the moat, may reflect the relatively small size and shallow nature of the water body. This observation is supported by the relatively low species diversity compared with lakes and rivers.

The water body appears to have been a permanent one during the period in which [716] and [720] accumulated. The diatoms present are properly aquatic and relatively well preserved. However, although more aquatic pollen species are recorded in [719] and [721] than in the monolith {43} profile, the numbers of these species, which include pond weed (*Potamogeton* type), bur reed and reed mace (*Typha angustifolia/Sparaganium* type) and spiked water milfoil (*Myriophyllum spicatum*) are lower than would be expected for the fills of a moat.

The occurrence of aerophilous diatoms (*Hantzschia amphioxys, Pinnularia* spp.) may represent material from bank or soil erosion or partial drying-out of the water body. As high concentrations of resistant chrysophyte cysts, that are usually found as a result of prolonged dry periods, were not found, it is likely that colluvial input or inwash of soil material, rather than drying out may be responsible for the presence of the aerophilous species. The lack of iron staining of the sediments also suggests the deposits were permanently wet and not subject to episodic drying out.

It is significant that the diatom assemblages do not show any evidence for very high levels of nutrients in the water. These would be associated with the discharge of large amounts of organic waste into the moat as has been observed at other moated sites or pools associated with human habitation (unpublished diatom data) and in ponds and lakes in the catchment of human settlement. The effects of such eutrophication would be seen in the types of diatom assemblage present, perhaps with blooms of planktonic diatoms adapted to high nutrient levels, shading macrophytes and benthic algae and thus dominating the fossil assemblage. The lack of these diatom species suggests the water may have been kept deliberately clean.

Pollen from [719] and [721] suggests, as in the Phase 2 samples, that a relatively diverse woodland environment surrounded the moated manor. Alder dominates the [721] assemblage, but decreases upwards, whilst oak and hazel are relatively high in both contexts. It is likely that alder was growing on the valley floor (its development, perhaps as a result of increased run-off following selected woodland clearance may be recorded in the monolith {43} sequence, see above) but it may have been cleared at much the same time as the gravel was deposited. If alder trees were fringing the moat their pollen would mask the background woodland pollen rain. The removal of alder would therefore allow the local woodland assemblage to register in the moat fills. Clearance might also be indicated by the herb species found in the samples from [719] and [721], such as black bindweed (*Fallopia convolvulus*), charlocks (*Sinapis* type), docks (*Rumex*) and mugwort (*Artemisia*), which may represent colonisation of the disturbed ground.

The combined evidence of the sediments and their microfossil inclusions would, therefore, seem to suggest that the gravels and overlying sandy silts (contexts [721], [741], [720], [719] and [716]), which overlie the primary moat fills of cut [726] represent a later phase of moat utilisation. The gravels may have been deliberately laid to form a clean bed for a small body of shallow slow moving water. At the same time, the alder trees, which had developed across the valley floor and probably fringed the moat feature during Phase 2, appear to have been cut down, suggesting the clearance of the moat area for some kind of activity. The clean, non-polluted nature of the water suggests the feature was not a typical moat, collecting refuse and effluent from the building complex it surrounded, but was kept clean deliberately, which might be echoed in the general lack of aquatic plants. Throughout the period of this re-modelling of the moat, however, and for the period of the Phase 2 moat, the site lay within a fairly diverse woodland environment, dominated by oak and hazel, but including elm, ash, lime and hornbeam.

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