Evaluation of the plant remains in samples from Crossrail, Pudding Mill Lane (XSK10)

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Human Environment
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Nine environmental bulk samples, each of approximately 10 litres, were taken alongside geoarchaeological monoliths, from a section through alluvial deposits. Eight litres from each sample were processed by flotation, and the wet flots assessed to determine the presence and nature of any plant remains and other biological material present. A further two litres from each sample was retained for any future work on invertebrates. The majority of samples produced moderate to large assemblages of waterlogged plant remains, including many roots or wood in some, and a variety of seeds and fruits.

Despite a relatively large volume of fragmentary roots and rootlets, sample [13]{9} from organic peaty mud at the base of the sequence produced only a small number of seeds, which are unlikely to allow any sort of environmental reconstruction. A very small number of mollusc shells were also seen.

The overlying deposit of grey, organic alluvial clay [12]{8} contained a larger amount of organic remains consisting mostly of wood and root fragments, but with rather more seeds than the previous sample. These were again quite mixed however, and included several from dry-ground plants as well as examples of marsh marigold (*Caltha palustris*), water pepper (*Persicaria hydropiper*) and sedge (*Carex* sp.) which may have grown in shallow water or wet marginal land as the alluvium built up.

Sample {7} was taken from the transition between the clay deposit [12] and the overlying, coarser-grained deposit [11]. Small wood and root fragments were again common, and a much larger seed assemblage was present. A wider range of aquatic and wetland plants was represented than in the previous sample, and dry-ground taxa such as self-heal (*Prunella vulgaris*), dandelion (*Taraxacum* sp.) and buttercups (*Ranunculus acris/bulbosus/repens*) suggested the presence of grassy places nearby.

Wood fragments, several large enough for species identification if required, dominated sample [11]{6} from the coarse, bedload deposit. Buds and seed capsules of willow (*Salix* sp.), leaf fragments and occasional thorns also indicate that trees and scrub grew on the river banks during the late medieval or post-medieval periods. A large and diverse seed assemblage included similar environmental indicators to that from sample {7}, with the majority of taxa from aquatic/wetland plants and grassy places. Very many mollusc shells were also present in this sample.

A much smaller plant assemblage from the overlying alluvial clay layer [10]{5} again suggested shallow water and wet conditions, with grassland, although the amount of wood was very much reduced and no other evidence was seen for trees or shrubs. While this might suggest clearance of the river banks, the small assemblage may result from partial drying of the deposit at some time, leading to partial decomposition of organic remains. This may be supported by the lack of any plant remains in sample {4} from the same deposit.

The overlying sandy alluvium [9]{3}, thought to represent a further channel bed, again produced a relatively small, though quite diverse plant assemblage. While taxa such as

water-plantain (*Alisma* sp.), fool's watercress (*Apium nodiflorum*) and water pepper (*Persicaria hydropiper*) represent plants from the banks and river's edge, seeds from plants of disturbed ground and grassy places close to the river were also present. Some wood fragments and occasional seeds of bramble (*Rubus* cf. *fruticosus*) and elder (*Sambucus nigra*) suggest that at least some woody plants survived in the vicinity.

No plant remains survived in samples {1} and {2} from channel fill [8], presumably due to drying of the deposits.

Invertebrate remains, in the form of insect exoskeleton fragments, were moderately abundant in sample {7}, and also noted in {8}, {6}, {5} and {3}. Shells of freshwater and/or terrestrial molluscs were seen in all samples except {1}, but in {2} and {4} were simply in the form of small fragments. Quite large numbers of shells were present in {7}, {6} and {3}, and several in {8} and {5}. Some ostracods were seen in {7} and {3}.

The good preservation of organic remains, both flora and fauna, in many of the samples indicates that further sampling of natural and anthropogenic deposits should be undertaken in any further excavations on the site. Analysis of these will enable a picture to be built up of the changing environment on the site, and possibly also of human activities taking place in the neighbourhood.

Of the samples evaluated so far, {3}, {5} and {9} produced only very small assemblages, the majority of which have been recorded. The remaining three samples ({6}, {7} and {8}) from [11] and [12] contained relatively large plant assemblages whose further study would contribute to the reconstruction of the environment at the time of deposition, and assist in the interpretation of the site. Study of the insects from the same samples would add additional information about the environment of the site and its surroundings.

Estimate for botanical analysis

Scanning, id & recording of plants from 3 waterlogged samples:	2.0 days
Data entry, production & editing of tables:	0.5 days
Analysis of results, research and production of archive report:	2.5 days
Total:	**5.0 days**

Insect remains

Retained soil from three of the samples should be processed and submitted to an insect specialist for identification of the remains. Specialist rates vary, but assessment is likely to cost c. £200 and subsequent analysis between £80 and £360 per sample, depending on the level of detail required. Additional time will be required for MoLA to liaise with the specialist, package samples, and provide relevant information. Paraffin flotation by MoLA processors and/or retrieval of unprocessed soil from Camberwell will also be necessary.

Liaison & packaging time (MoLA):	0.25 day
Paraffin flotation of 3 samples/retrieval from Camberwell:	1.0 day
Insect specialist time:	initially c. £160, then to be negotiated.

Table 1: Summary of environmental assessment data

A: abundance, D: diversity (1 = occasional, 2 = moderate, 3 = abundant)

context	sample	Bl	proc vol(l)	flot vol(ml)	proc	A D	A D	A D	comments
8	1		8		W	1 1			NO FLOT
8	2		8		W				NO FLOT
9	3		8	15	F	1 1	2 2	2 2	WET. WET & DRY GROUND PLANTS, VEGETATION
9	3				W	1 1			
10	4		8		W				NO FLOT
10	5		8	5	F	1 1	2 2	2 2	WET. GRASS & WETLAND PLANTS
11	6		8	250	F		3 3	3 3	WET.MUCH WOOD, MANY SEEDS & MOLLUSCS
11	6				W	1 1			
11	7		10	60	F	1 1	3 3	3 2	WET. MOSTLY WET & GRASSLAND PLANTS
12	8		8	150	F	1 1	2 2	3 1	WET. HIGHER % ROOTS. FEW MOLLUSCS
13	9		8	80	F		2 1	3 1	WET. FINER FRAGS. MOSTLY ROOTS. FEW SEEDS