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CENTRE FOR ARCHAEOLOGY

Ancient Monuments Laboratory
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Summary

During the construction of this road in 1984-5 sections across parts of the main Chelmer valley and the valley of the Sandon Brook were recorded and sampled for pollen, macrofossils and radiocarbon dating. The following results were obtained from macrofossil analysis:
a) Chelmer Bridge section. Detritus muds filling an abandoned channel, dated to 1760-1250bc, produced macrofossil assemblages indicating an initial cover of Alnus and subsequent development of open conditions. After 1250bc local vegetation was dominated by Urtica dioica and other weeds and wetland taxa.
b) Sandon Culvert section. Similar detritus muds but with some sandy sediments indicating intermittent stream flow were dated to 180-1090ad. Macrofossils from trees (mostly Salix) were comparatively rare: conditions remained open locally throughout the period. Rich assemblages of seeds from wetland and aquatic taxa and weeds were retrieved. Remains of cereals were present in all samples, and a capsule of flax (Linum usitatissimum) was identified.

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Introduction

During the construction of the new Chelmsford By-Pass in 1984/5 sections through Flandrian valley sediments were exposed at the site of the new Chelmer Bridge and at a road culvert crossing a tributary stream, the Sandon Brook. In an earlier report (Murphy and Wilkinson, forthcoming) these sections have been fully described and related to other stratigraphic data from the Chelmer Valley. In this report plant macrofossils from the sediments are listed and discussed, though for the sake of clarity relevant stratigraphic and dating evidence is repeated.

Stratigraphy and dating

1. Chelmer Bridge (TL 74387 06547)

The deepest section (Section 1) was visible at a point about 40m. upstream from the south bridge abutment.

Section 1

0-130cm.	Yellowish-brown silty clay loam, becoming greyer and more mottled with depth; well developed subangular blocky peds; very rare rounded and subangular flints and quartz pebbles up to 2cm; very rare fragments of heat-shattered flint; fibrous roots and worm burrows, decreasing with depth; boundary merging over about 10cm.
130-185cm.	Grey silty clay loam, yellowish-brown on ped faces; weakly developed subangular blocky peds; stoneless; fine dark brown roots extending vertically; sharp boundary.
185-195cm.	Detritus mud: very dark greyish brown organic silt loam paler and less organic at base; wood fragments fairly common in top 5cm, rarer below; rare charcoal fragments; sharp boundary.
195-230+cm.	Rounded to subangular flint gravel in grey coarse sand; moderately soft and loose; some large woody roots penetrating from above.

From this point a new channel had been dug for about 40m. in the direction of the bridge abutments. The channel sides did not give a very clear section since they were cut at an angle of about 45° and the faces were obscured by slipped material. Partial cleaning of the section revealed that the underlying

gravel surface rose steadily towards the bridge, so that just by the bridge abutments the lower grey silty clay loam and organic woody silt loam were absent, and the gravel was covered by only about 75cm. of yellowish-brown silty clay loam. Before pinching out, however, the lower organic deposits became thicker and much more woody. These lower layers were sampled as section 2, at a point about 25m. from the bridge.

Section 2 (recording only the lowest 40cm. of the section).

0-10cm.	Grey silty clay loam; weakly developed subangular blocky peds; almost stoneless; becoming more organic below; charcoal flecks; sharp boundary.
10-32cm.	Detritus mud: very dark greyish-brown organic silt loam packed with wood fragments including branches up to c.10cm. diameter; sharp boundary.
32-40+cm.	Rounded to subangular flint gravel in grey coarse sand.

A sample of wood from the base of the detritus mud in section 2 was dated to 3710 ± 80bp or 1760bc (HAR-6682) and wood from the top of this deposit gave a date of 3200 ± 70bp or 1250bc (HAR-6683).

2. Sandon Culvert (TL 74700 04550)

This vertical section across an old channel was exposed in the valley of Sandon Brook at the site of excavations for a road culvert. The sediments at the edge of the channel, from which samples for palaeoecological studies were removed, were as follows:

0-90cm.	Yellowish-brown silty clay loam; moderately developed sub-angular blocky peds; very rare flint pebbles; becoming greyer and more mottled with depth; worm burrows throughout; merging boundary.
90-105cm.	Pale grey clay loam; very weak ped development; stoneless; rare orange mottles at top; sharp boundary.
105-143cm.	Detritus mud: humic dark grey silt loam with some sand; abundant wood fragments and leaves, the wood lying horizontally; rare small charcoal fragments at base; merging boundary.
143-150cm.	Dark grey medium coarse sand with patches of silt; poorly sorted; some wood fragments; sharp boundary.
150-250+cm.	Sub-angular to well-rounded flint gravel in orange and dark reddish-brown coarse sand; weakly stratified; moderately soft and loose.

A sample of wood from near the base of the detritus mud gave a radiocarbon date of 1770 ± 70bp or 180ad (HAR-6580), whilst wood from near its top was dated to 860 ± 70bp or 1090ad (HAR-6570).

Sampling and retrieval

Column samples, sub-divided usually at 5 or 10cm vertical intervals were collected for macrofossil analysis and sample series were also taken for pollen analysis. The macrofossil samples, 0.5kg in weight, were disaggregated by soaking in water or NaOH solution as necessary, and then graded in sieve banks with a minimum mesh of 250 microns. The sieved fractions were sorted under a binocular microscope at low power, picking out fruits, seeds, leaves, buds, twigs, mosses and charcoal. Insect remains and occasional small mammal teeth were also present. The fine fraction (500-250 microns) was not completely sorted but only scanned over: the only seeds present were of Juncus spp, for which counts were therefore not obtained. Plant remains identified are listed in Tables 1 and 2.

Discussion

The deposits seen at the Chelmer Bridge are thought to have formed within an abandoned channel, which no longer contained flowing water but was subject to flooding. Section 1 was probably near the middle of the channel, section 2 at its margin. The samples from Section 1 produced only very sparse assemblages of macrofossils, many of which are in a very poor state of preservation. Nutlets of sedges (Carex spp) are fairly common. It would appear that conditions were not suitable for the establishment of continuous vegetation cover or for good seed preservation due, perhaps, to periodic inundation and desiccation. The samples from section 2 are more informative: At 20-32cm the predominance of alder fruits and 'cones' (Alnus glutinosa) suggests the presence of wet alder woodland fringing the channel at about 1760bc. Other woodland taxa represented by macrofossils at this level include Tilia sp (lime), Ilex aquifolium (holly), Prunus domestica subsp. insititia (bullace), Crataegus monogyna (hawthorn), Rosa sp (rose), Corylus avellana (hazel), Quercus sp (oak), Salix sp (willow) and Sambucus nigra (elder). With the exception of holly and rose remains of these shrubs and trees have also been reported by Peglar and Wilson (1978) in a detritus mud dated to 1410bc from the Chelmer Valley at Little Waltham. A mixture of macrofossils from wet valley floor woods and drier woodland elsewhere in the catchment is represented. Macrofossils of weed, wetland and aquatic plants are uncommon at this level, but in the sample from 10-20cm remains

of such taxa increase in frequency, notably Stellaria media, Chenopodium album, Atriplex sp, Rumex sp(p), Urtica dioica, Lycopus europaeus, and Alisma plantago-aquatica. The frequency of Alnus fruits and remains of other woodland taxa is reduced. This trend continues in the sample from the silty clay loam at 0-10cm: Alnus fruits are absent in the sample from this level but weed seeds are common. The abundance of Urtica dioica and the appearance of Ranunculus sceleratus at 0-10cm. implies damp, open, nutrient-rich conditions in this part of the valley floor after 1250bc. How large a catchment this relates to is difficult to establish (cf. Caseldine, Juggins and Straker, forthcoming). However it is probable that the macrofossil results relate mainly to local vegetation, but include a 'seed' input from a wider area introduced by overbank flooding.

The sediments in the channel seen at the Sandon Culvert included similar detritus muds but also some sandy sediments, implying intermittent stream flow as the channel became infilled. The samples from this site produced richer assemblages than those from the Chelmer Bridge and this might be related to these different conditions of deposition. Alternatively valley size might be relevant: in a small valley the seed catchment area is likely to have included a more diverse range of habitats than a similarly-sized catchment in a large valley with an extensive flood-plain.

Wood, twigs, leaf fragments, buds and budscales were abundant in the detritus mud in the Sandon Culvert channel and fruits and seeds of woodland, scrub and hedgerow plants were identified. Taxa present include Moehringia trinervia (three-nerved sandwort), Acer campestre (field maple), Rubus fruticosus (bramble), Rubus idaeus (raspberry), Prunus spinosa (sloe), P. domestica subsp. insititia (bullace), Crataegus monogyna (hawthorn), Thelycrania sanguinea (dogwood), Anthriscus sylvestris (cow parsley), Mercurialis perennis (dog's mercury), Corylus avellana (hazel), Quercus sp. (oak), Salix sp. (willow/sallow), Solanum dulcamara (bittersweet) and Sambucus nigra (elder). It appears that the macrofossils in this deposit are derived from at least two types of vegetation. The remains of Salix spp. probably came from willows and sallows growing in the valley floor in the immediate vicinity: Salix caprea, cinerea, fragilis and purpurea nowadays rapidly colonise wet valley floor sites unless artificially cleared (Jermyn 1974, 40). Acer campestre, Thelycrania sanguinea and Mercurialis perennis are particularly characteristic of well-drained calcareous soils (Clapham et al 1962) and the remains of these plants are likely to have been dispersed from woodland or possibly hedgerows at dry sites on the flanks of the valley.

Despite this diverse range of tree, shrub and woodland herb taxa, macrofossils of woodland plants are not numerically abundant in these samples, and Alnus is, surprisingly, not represented. Evidently conditions were fairly open in the vicinity throughout the infilling of the channel from 180ad to 1090ad.

Wetland and aquatic taxa are well represented, and it seems possible that the relatively wide range of taxa compared to that from the Chelmer Bridge is related to active stream flow at this site. Taxa identified include Ranunculus flammula (lesser spearwort), Ranunculus sceleratus (celery-leaved crowfoot), Ranunculus subg. Batrachium (crowfoot), Rorippa cf. microphylla (water-cress), Hypericum sp. (St John's wort), Lychnis flos-cuculi (ragged robin), Stellaria alsine (bog stitchwort), Montia fontana (blinks), Filipendula ulmaria (meadowsweet), Epilobium sp. (willow herb), Apium nodiflorum (fool's watercress), Oenanthe spp. (water dropworts), Polygonum hydropiper (water pepper), Rhinanthus minor (yellow rattle), Mentha arvensis/aquatica (probably water mint), Lycopus europaeus (gipsywort), Scutellaria sp. (skullcap), Bidens cernua and B. tripartita (bur marigold), Eupatorium cannabinum (hemp agrimony), Alisma plantago-aquatica (water plantain), Potamogetonaceae (pond weeds), Juncus spp. (rushes), Iris pseudacorus (yellow flag), Lemna sp. (chickweed), Sparganium sp. (bur-reed), Typha sp. (reed-mace), Eleocharis palustris/uniglumis (spike-rush), Isolepis setacea (bristle scirpus), Carex spp. (sedges). At 135-143cm. fruits of Alismataceae account for 13.1% of the total 'seed' count but above this decline steadily in frequency: at 125-135cm. 10.2%, at 115-125cm. 4.2% and at 105-115cm. 2.7%. This seems to indicate that local conditions became progressively drier as the channel became infilled with mineral sediment and plant debris.

Grassland plants identified are Ranunculus acris/repens/bulbosus (buttercups), Potentilla reptans (creeping cinquefoil), Potentilla erecta (tormentil), Linaria vulgaris (toadflax) and Prunella vulgaris (self-heal).

Fruits and seeds of weeds occur throughout the deposits, colonising in part natural disturbed habitats produced by river action. Urtica dioica is relatively most abundant in the clayey mineral sediments overlying the organic detritus muds, as in the Chelmer Bridge section.

The remains of crop plants are of particular interest. Carbonised grains and spikelet fragments of spelt (Triticum spelta) were found in all the samples, and remains of emmer (Triticum dicoccum) and oats (Avena sp)

occurred near the base of the sequence. The sample from 105-115cm. included a capsule fragment of flax (Linum usitatissimum). Charcoal fragments were present in all samples. These crop plant remains clearly indicate cultivation within the catchment, apparently continuously from 180ad to 1090ad. The presence of spelt throughout the sequence, up into sediments dating to the Late Saxon period, is consistent with results from Saxon contexts at Springfield Lyons which have also produced this cereal (Murphy, in preparation).

Conclusions

The results from these two sections indicate environmental changes in the valleys of the Chelmer and Sandon Brook between 1760-1250bc. and 180-1090ad. respectively. These changes can be related to the settlement archaeology of the area. At the Chelmer Bridge a change in local vegetation from alder woodland to more open weed vegetation was near-contemporary with the establishment of the large circular Late Bronze Age enclosure at Springfield Lyons. It seems reasonable to associate this change with more intensive use of the valley floor for grazing. At the Sandon Culvert macrofossil evidence indicates persistence of locally fairly open conditions from the late Roman to late Saxon periods, with no evidence for valley woodland regeneration at the end of the Roman period. Remains of cereals and flax indicate apparently continuous arable farming throughout the period of sedimentation. This is consistent with the archaeological evidence for settlement in the Chelmer Valley through this period.

References

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Depth (cm)	Section 1			Section 2		
	180-185	185-190	190-195	0-10	10-20	20-32
Ranunculus acris/repens/bulbosus	-	-	1	8	18	1
Ranunculus sceleratus L.	-	-	-	11	-	-
Ranunculus subgenus Batrachium	-	-	-	-	2	-
Thalictrum sp.	-	-	1	-	-	-
Chelidonium majus L.	1	-	-	-	-	-
Fumaria officinalis	-	-	-	1	-	-
Cruciferae indet.	-	-	-	2	-	-
Lychnis flos-cuculi L.	-	-	-	1fr	1fr	-
Stellaria media-type	-	-	-	10	46	-
Stellaria sp.	-	-	-	-	3	18
Moehringia trinervia (L) Clarv.	-	-	-	-	2	-
Caryophyllaceae indet.	-	-	-	-	2	1
Chenopodium album L.	-	-	-	33	140	3
Chenopodium sp.	-	-	-	2	-	-
Atriplex sp.	-	-	-	79	51	-
Chenopodiaceae indet.	-	-	-	69	44	-
Tilia sp. (immature fruits)	-	-	-	-	1	17+cf5
Ilex aquifolium L.	-	-	-	-	-	1
Rubus fruticosus agg.	-	-	-	-	1	-
Rubus sp.	-	-	-	1	-	-
Potentilla spp.	-	2	1	1	-	-
Aphanes arvensis L.	-	-	-	1	-	-
Prunus domestica subsp. insititia	-	-	-	-	-	2
Crataegus monogyna Jacq.	-	-	-	-	2	2
Rosa-type (thorn)	-	-	-	-	-	+
Epilobium sp.	-	-	-	-	2	-
Berula erecta (Hudson) Coville.	-	-	-	-	1	-
Aethusa cynapium L.	-	-	-	1	-	-
Polygonum aviculare agg.	-	-	-	-	1	-
Polygonum sp. (p)	-	-	-	2	13	3
Rumex sp. (p) (perianths absent or poor)	-	-	-	35+4cf	75	3
Urtica dioica L.	-	5	-	145	66	22
Alnus glutinosa (L) Gaertner (fruits)	-	-	-	-	86	148
A. glutinosa ('cones')	-	-	-	-	10	40
Corylus avellana L.	-	-	-	-	+	1+
Quercus sp. (cupule frags)	-	-	-	-	-	1
Salix sp. (capsule frag)	-	-	-	-	-	1
Solanum dulcamara	-	-	-	-	1	-

Solanum nigrum L.	-	-	-	-	9	-
Solanum sp.	-	-	-	1fr	-	-
Mentha arvensis/aquatica	-	2	-	21	6	-
Lycopus europaeus L.	-	1	-	19	26	-
Prunella vulgaris L.	-	-	-	-	9	-
Stachys sp.	-	-	-	1	2	-
Lamium cf. album L.	-	-	-	1	-	-
Lamium sp.	-	-	-	-	1cf	-
Galeopsis tetrahit/speciosa	-	-	-	2fr	3	3
Ajuga sp.	-	-	-	-	1fr	-
Plantago major L.	-	-	-	1	4	-
Sambucus nigra L.	-	-	-	5	4	4
Lapsana communis L.	-	-	-	-	1	-
Cirsium/Carduus sp.	-	1	-	1	4	-
Sonchus oleraceus L.	-	-	-	-	3	-
Sonchus asper (L) Hill.	-	-	-	-	2	-
Compositae indet.	-	-	-	-	2	-
Alisma plantago-aquatica L.	-	-	-	22	56	2
Alismataceae indet.	-	-	-	18	5	-
Juncus spp.	-	-	-	+	+	+
Sparganium sp.	-	-	-	1	-	-
Eleocharis uniglumis/palustris	-	-	-	2	-	-
Carex spp.	-	17	38	5	6	4
Cladium mariscus (L) Pohl.	-	-	-	-	-	2cf
Scirpus sp.	-	1	1	-	-	-
Charcoal	-	+	-	+	-	-
Twigs/wood	+	+	+	+	+	+
Buds/budscales	-	-	+	-	+	+
Leaf fragments	-	-	-	-	+	+
Thorns	-	-	-	-	+	+
Indeterminate seeds etc.	-	16	10	7	14	25

Table 1: Plant macrofossils from Sections 1 and 2 at the Chelmer Bridge.

Unless otherwise indicated taxa are represented by fruits or seeds. Nomenclature and taxonomic order after Clapham et al 1962. Further samples from Section 1 contained only the following plant remains: 195-200cm. wood fragments; 170-180cm. wood fragments, bud-scale fragments, charcoal; 160-170cm. charcoal.

Depth (cm)	95-105	105-115	115-125	125-135	135-143	143-150
Ranunculus acris/repens/bulbosus	1	11	33	56	71	2
Ranunculus flammula L.	-	7	15+cf7	48	56	4
Ranunculus sceleratus L.	-	1	1	-	-	-
Ranunculus subg. Batrachium	1	1	3	6	5	-
cf. Nymphaeaceae	-	-	-	-	1	-
Fumaria officinalis L.	-	-	-	2	-	-
Rorippa cf. micophylla (Boenn) Hyl.	-	-	1	3	-	-
Viola sp.	2	-	-	1	-	-
Hypericum sp.	6	4	3	1	1	1
Silene sp.	-	-	1	-	-	-
Lychnis flos-cuculi L.	2	58	88	37	46	8
Stellaria palustris/graminea	-	-	3	6	2	-
Stellaria cf. holostea L.	-	-	-	7	4	-
Stellaria alsine Grimm.	1	28	22	19	-	-
Stellaria sp.	-	3	7	4	8	1
Moehringia trinervia (L) Clairv.	-	-	1	-	1	-
Caryophyllaceae indet.	-	-	-	-	2	-
Montia fontana L. subsp. chondrosperma	-	1	4	5	4	2
Chenopodium album L.	-	-	12	18	8	1
Atriplex sp.	-	5	5	9	6	3
Chenopodiaceae indet.	-	2	3	7	5	2
Malva sp.	-	-	-	1	-	-
Linum usitatissimum L (capsule frag)	-	+	-	-	-	-
Acer campestre L.	-	9	9	-	-	-
Filipendula ulmaria (L) Maxim.	-	4	34	13	7	3
Rubus fruticosus agg.	9	4	-	3	7	-
Rubus idaeus L.	1	-	-	-	-	-
Rubus sp.	-	-	fr	-	-	-
Potentilla erecta (L) Rauschel.	-	-	-	2cf	1	-
Potentilla reptans L.	-	-	3	3	1	-
Potentilla sp.	-	1	4	4	1	-
Aphanes arvensis L.	-	-	-	2	1	1
Aphanes cf. microcarpa (Boiss + Reuter) Rothm.	-	1	2	6	5	-
Prunus spinosa L.	-	-	1+fr	fr	1	-
Prunus domestica subsp. insititia	-	-	-	-	1	-
Crataegus monogyna Jacq.	-	fr	2+fr	-	1+fr	2
Rosaceae indet. (thorn)	-	+	-	+	+	-
Epilobium sp.	-	3	37+3cf	33	30	2
Thelycrania sanguinea (L) Fourr.	-	4+fr	2+fr	2	-	-

Anthriscus sylvestris (L) Hoffm.	-	1	-	-	-	-
Apium nodiflorum (L) Lag.	1	41	202	153	66	10
cf. Berula erecta (Hudson) Coville.	-	2	4	-	-	-
Oenanthe aquatica (L) Poiret.	-	-	-	-	1	-
Oenanthe sp.	-	-	-	5	4	-
Umbelliferae indet.	-	2	4	3	-	-
Mercurialis perennis L.	-	1	-	-	-	-
Polygonum aviculare agg.	-	-	1	17	5	3
Polygonum hydropiper L.	-	13cf	9+57cf	6+43cf	2+32cf	4cf
Polygonum lapathifolium L.	-	-	-	1	-	-
Rumex acetosella agg.	-	-	-	1	4	-
Rumex sp.	-	101	99	112	70	5
Urtica urens L.	-	-	1	1	-	-
Urtica dioica L.	56	84	83	45	24	10
Corylus avellana L.	-	+	+	-	-	-
Quercus sp. (cupule frags)	-	+	+	+	-	-
Quercus sp. (leaf frags)	-	+	+	-	-	-
Salix sp. (capsules/frags)	-	1	21	10	16	2
cf. Anagallis arvensis L.	-	-	-	-	1	-
Boraginaceae indet.	-	-	2	-	-	-
Solanum dulcamara L.	-	15	24	22	10	1
Linaria vulgaris Miller.	-	-	-	1	-	-
Scrophularia sp.	1	-	-	-	-	1
Rhinanthus minor L.	-	1	-	-	-	-
Mentha arvensis/aquatica	26	87	105	63	50	13
Lycopus europaeus L.	1	33	49	9	5	1
Prunella vulgaris L.	-	1	-	5	12	-
Stachys sp.	-	5	4	3	3	-
Galeopsis tetrahit/speciosa	-	1	5	2	1	-
Scutellaria sp.	-	-	1	-	3	-
Labiatae indet.	-	4	2	-	-	-
Plantago major L.	1	4	5	9	1	-
Galium sp.	-	-	-	1	3	-
Sambucus nigra L.	1	2	14	10	11	4+fr
Bidens cernua L.	-	-	3	2	3	-
Bidens tripartita L.	-	1	-	-	-	-
Eupatorium cannabinum L.	-	5	3	-	-	-
Anthemis cotula L.	-	2	3	19	2	8
Cirsium/Carduus sp.	-	4	5	8	13	1
Lapsana communis L.	-	-	2	-	2	-
Sonchus asper (L) Hill.	-	-	-	8	3	1
Compositae indet.	-	-	2	3	7	-
Alisma plantago-aquatica L.	-	6	42	101	97	6
Alismataceae indet. (embryos)	-	17	16	12	13	1

Potamogetonaceae indet.	-	1	7	10	6	-
Juncus spp.	+	+	+	+	+	+
Iris pseudacorus L.	frag(?)	fr	fr	-	-	-
Lemna sp.	3	3	3	1	-	-
Sparganium sp.	-	9	6	8	9	2
Typha sp.	2	6	4	1	1	-
Eleocharis uniglumis/palustris	-	-	10	20	12	-
Isolepis setacea (L) R.Br.	-	-	-	-	-	1
Carex spp.	14	219	220	43	14	-
Gramineae indet.	-	-	8	16	20	-
Cereal indet.*	1	1	-	-	2	-
Triticum sp.*	1	-	1	-	-	-
Triticum spelta L. (glume base)*	1	2	1	4	5	2
Triticum spelta L. (spikelet fork)*	-	-	-	-	1	-
Triticum spelta L. (rachis internode)*	-	1	-	-	-	-
Triticum dicoccum Schübl. (glume base)*	-	-	-	-	-	1
Triticum sp. (glume base)*	1	1	-	2	-	-
Triticum sp. (spikelet base)*	-	-	-	-	4	1
Avena sp. (Awn fragment)*	-	-	-	-	+	-
Bromus sp.*	-	-	-	-	1	-
Charcoal*	+	+	++	+++	++	+
Twigs/wood	+	+++	+++	+++	+++	+
Buds/budscales	-	+++	+++	+++	+++	+
Leaf fragments	-	++	++	++	++	+
Indeterminate seeds etc.	2	21	47	28	22	5
Total 'seed' count	135	847	1383	1107	837	115

Table 2: Plant macrofossils from the Sandon Culvert section.

Unless otherwise indicated taxa are represented by fruits or seeds.
Carbonised specimens are marked with an asterisk.
Nomenclature and taxonomic order after Clapham et al (1962).

ENGLISH HERITAGE

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