2555

Ancient Monuments Laboratory
Report 45/95

EVALUATION OF THE ENVIRONMENTAL POTENTIAL OF SEDIMENTS AT BELMONT MOATED SITE, GREAT BUDWORTH, CHESHIRE

D Weir
M Canti

AML reports are interim reports which make available the results of specialist investigations in advance of full publication. They are not subject to external refereeing and their conclusions may sometimes have to be modified in the light of archaeological information that was not available at the time of the investigation. Readers are therefore asked to consult the author before citing the report in any publication and to consult the final excavation report when available.

Opinions expressed in AML reports are those of the author and are not necessarily those of the Historic Buildings and Monuments Commission for England.

Ancient Monuments Laboratory Report 45/95

EVALUATION OF THE ENVIRONMENTAL POTENTIAL OF SEDIMENTS AT BELMONT MOATED SITE, GREAT BUDWORTH, CHESHIRE

M Canti
D Weir

Summary

Sediments from the moated site at Belmont Hall, Great Budworth have been examined, described and selectively analysed for pollen content, with a view to assessing whether detailed analytical work is needed before the proposed cleaning of the moat. Results indicate that there may have been some dredging in the past and only the very basal layers are original. These contain an unusual juxtaposition of cereal and heather pollens, suggesting either crop processing on site, or deliberate soil improvement which enabled the planting of cereals on previously acid land.

Authors' addresses :-

Mr M Canti
ENGLISH HERITAGE
23 Savile Row
London
W1X 1AB

Dr D Weir
ENGLISH HERITAGE
23 Savile Row
London
W1X 1AB

© Historic Buildings and Monuments Commission for England

Evaluation of the Environmental Potential of Sediments at Belmont Moated Site, Great Budworth, Cheshire

by M.G.Canti and D.A.Weir

1. Introduction

A large moat and associated fishpond are situated in the grounds of Belmont Hall, Great Budworth, Cheshire. The site was part of a medieval monastic grange and was granted to Norton Priory by Geoffrey Dutton during the reign of Henry I. There are around 6000 such moated sites in England, mostly dating from the thirteenth and fourteenth centuries. They are widely thought to have been built as prestige residences rather than serious defences.

The current owner, Mr R.C. Leigh, wishes to carry out dredging and clearance work on the moat and fishpond. Since the site is a scheduled monument, the archaeological impact of the proposed work needs to be evaluated. This report concerns the examination of the sediments in the moat and their potential for the preservation of environmental remains.

2. Site Details

The moat itself is roughly rectangular in plan (see Figure 1) and encloses about 0.5 ha. of oak, beech and rhododendron woodland. In most places, the ditch is about 7-15 m across but reaches a greater width on the north side, particularly where a large triangular pool has been produced by diagonally cutting the NE inside corner. In many places, rhododendron growth obscures the moat, and all parts except a single cleared area are overhung by trees, mainly beech.

One short reach of a few metres has been recently dredged. Apart from that, the owner is unaware of any dredging episodes, and the estate records were destroyed during the blitz in Liverpool.

Two reaches of the moat were dry during an August visit in the severe drought of 1995 (Figure 1). Even here, however, the sediment surface was extremely soft.

The fishpond is an east-west elongated area of about 0.5 ha. adjacent to the north side of the moat. It was completely dry and most of the surface was firm. Central areas are still reed-covered, but much of the surface supports birch trees and brambles.

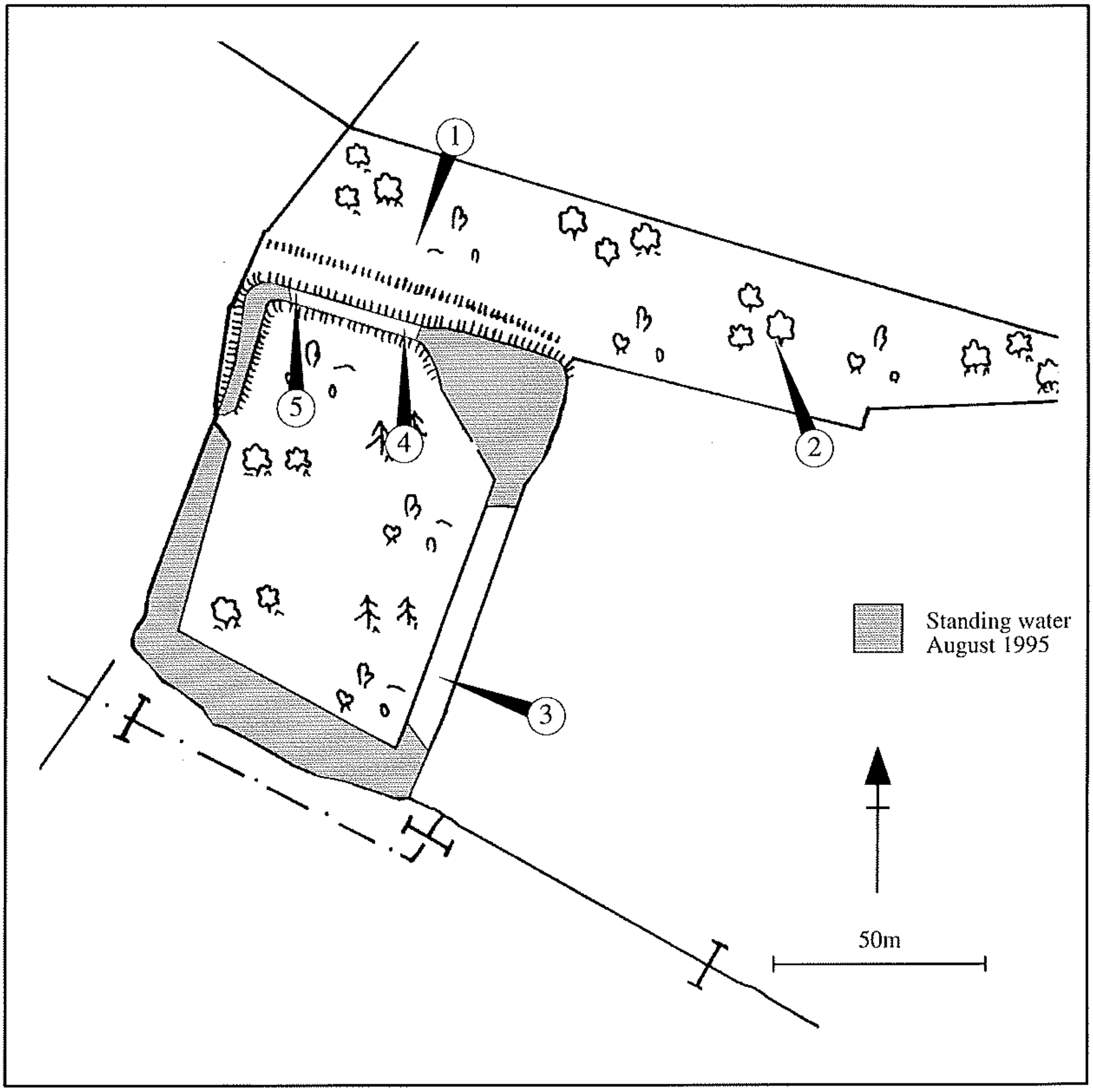

Figure 1. The general layout of the moat showing core positions.

3. Coring Work

3.1 Fishpond

The fishpond was probed in a number of places and found to be invariably shallow and lacking in significant mineral sediment accumulation. Core 1 typifies what was found:-

Core 1 (Hand gouge)

0 - 20 cm	Black (10 yr 2/1) humus.
20 - 31 cm	Very dark greyish brown (10 yr 3/2) sandy clay loam.
31 - 42 cm	Reddish brown (5 yr 4/3) sandy clay loam with occasional patches of reduced colouration (grey, 5 yr 5/1).
42 - 60 cm	Patchy mix of very dark greyish brown (10 yr 3/2) and brown (5 yr 4/3) sandy loam with areas of reduced colouration (grey, 5 yr 5/1).
60 - 88 cm	Patchy mix of reddish brown (5 yr 5/3) and grey (5 yr 6/1) sandy clay loam.

This core shows a 20 cm modern humus layer overlying a thin band (20 - 31 cm) of humus stained mineral sediment accumulation. The 5 yr colours thereafter (31 cm onwards) are typical of the local Keuper and Bunter colouration (Permo-Triassic) implying natural boulder clay or solid geology. The brief return to humus-rich sediment represented by the patches between 42 and 60 cm was also found in core 2 and suggests a dredging episode smearing underlying materials over earlier sediments.

3.2 Moat

The moat was cored in three places (see Figure 1), the positions being largely determined by the practicability of retrieving cores in wet conditions.

Core 3 (Russian auger)

0 - 50 cm	Leaves and water, core unretrieved.
50 - 124 cm	Black (7.5 yr 2/0) leafmould, clear smooth boundary to:-
124 - 127 cm	Dark reddish brown (5 yr 2.5/2) sandy silt loam with organic matter. Abrupt smooth boundary to:-
127 - 129 cm	Dark reddish brown (5 yr 3/3) sandy loam.

This core shows little mineral inwash, being almost entirely composed of recent leafmould lying straight onto geological materials (124 cm onwards). This might suggest fairly recent dredging.

Core 4 (Russian auger)

0 - 50 cm	Leaves and water, core unretrieved.
50 - 112 cm	Black (7.5 yr 2/0) loose leafmould. Abrupt wavy boundary to:-
112 - 144 cm	Reddish brown (5 yr 4/3, moist) sandy loam with organic matter. Abrupt wavy boundary to:-
144 - 150 cm	Dark reddish brown (5 yr 2.5/2) sandy loam.

Core 5 (Russian auger)

0 - 50 cm	Leaves and water, core unretrieved.
50 - 105 cm	Black (7.5 yr 2/0) loose leafmould. Clear smooth boundary to:-
105 - 110 cm	Dark reddish brown (5 yr 2.5/2, moist) sandy loam with organic matter. Abrupt smooth boundary to:-
110 - 112 cm	Mixture of discrete areas of dark reddish brown (5 yr 2.5/2, moist), black (7.5 yr 2/0) and reddish brown (5 yr 4/3) sandy loam with organic matter. Abrupt smooth boundary to:-
112 - 116 cm	Dark reddish brown (5 yr 2.5/2, moist), silt loam with organic matter. Clear smooth boundary to:-
116 - 120 cm	Reddish brown (5 yr 4/3, moist), silty clay loam. Abrupt wavy boundary to:-
120 - 130 cm	Dark olive (5 y 3/2) sand.

Cores 4 and 5 contain considerably more mineral material than was found at core 3, perhaps reflecting less complete past dredging. It is important to note, however, that slight variations in sediment density are highly significant in determining whether the corer can be pushed in or not. The natural base appears to be at 144 cm in core 4, and 116 cm in core 5. The olive coloured sand at the base of core 5 owes its colour to an extraordinarily high (over 50%) clinopyroxene content. This is a mineral of igneous rocks, and high concentrations are found in Cheshire drifts (King 1977; Canti 1990).

4. Pollen Analysis

Skeleton pollen diagrams were prepared from two of the moat cores, in an attempt to determine whether the sequence represents continuous sedimentation since the 13th Century, or has been recently truncated. The leaf-mould sediments in the upper parts of the profiles seemed unlikely to have accumulated over a long period of time.

4.1 Methods

Pollen samples were taken from 4 levels towards the base of cores 3 and 5. Samples were prepared according to standard methods (Moore *et al.* 1991), stained with safranine and mounted in glycerol. A minimum of 150 grains of terrestrial plants were counted, and percentage pollen diagrams (Figures 2 and 3) produced using TILIA and TILIA.GRAPH (Grimm 1992). Pteridophyte spores, normally included in the palynomorph sum, were excluded in this case as the pollen sum used was so small. Plant nomenclature follows Clapham *et al.* (1987).

4.2 Results

The results for core 3 are presented in Figure 2 and those for core 5 in Figure 3. Preservation of pollen was very good throughout.

The basal sample from core 5 is the most distinctive, with a large proportion of ling (*Calluna vulgaris)* and very low levels of arboreal taxa. This suggests quite extensive ground cover of ling, at least in the immediate vicinity of the moat. Pollen of grasses (Gramineae) form the next major component, along with cereals including rye (*Secale*). The weed spectrum is quite restricted, but pollen types such as Chenopodiaceae (eg. fat hen) or *Achillea*-type (possibly mayweed or yarrow) could originate from arable ground. Although the pollen evidence might suggest considerable areas under arable agriculture, it is possible that much of the cereal pollen was derived from processing activities on the site itself. Either way, it seems likely that this high level records agricultural activities connected with the occupation of the site.

Subsequent samples show a dramatic decrease in ling pollen, along with increases in oak (*Quercus*) to 25-40%. Grass values remain high at 25-36%, although cereal pollen values are slightly lower and rye is not present. Of particular significance is the presence of planted tree species. These include pine (*Pinus*), fir (*Abies*), spruce (*Picea*) and beech (*Fagus*). Rhododendron, a 19th century introduction, is also present in the upper two samples. Together, these species show that the sediments from 0 - 105 cm have all accumulated in the recent past, the oak pollen also being derived from trees that were either planted or seeded in naturally.

The results from core 3 are slightly different, with the basal sample showing high ling and cereal pollen values as in core 5, but with oak at the higher value of 26%. Ling is commoner throughout, and alder (*Alnus*) increases to 15% in the upper sample. Overall, the upper three samples are, however, similar to those in core 5, with oak at 16 - 45% and planted species such as beech, possibly sycamore (*Acer*), and rhododendron present.

The juxtaposition of ling and cereal pollen at the base of the cores is the most interesting aspect of this pollen record. In general terms, these two types of plant require significantly different pH conditions to flourish. The possibility of cereal processing as the pollen source would explain this discrepancy. Alternatively, a scenario allowing them both to grow at the site near-contemporaneously is needed. It would seem, from the current predominance of rhododendron on the island, that the local soils tend towards acidity if left alone. This would

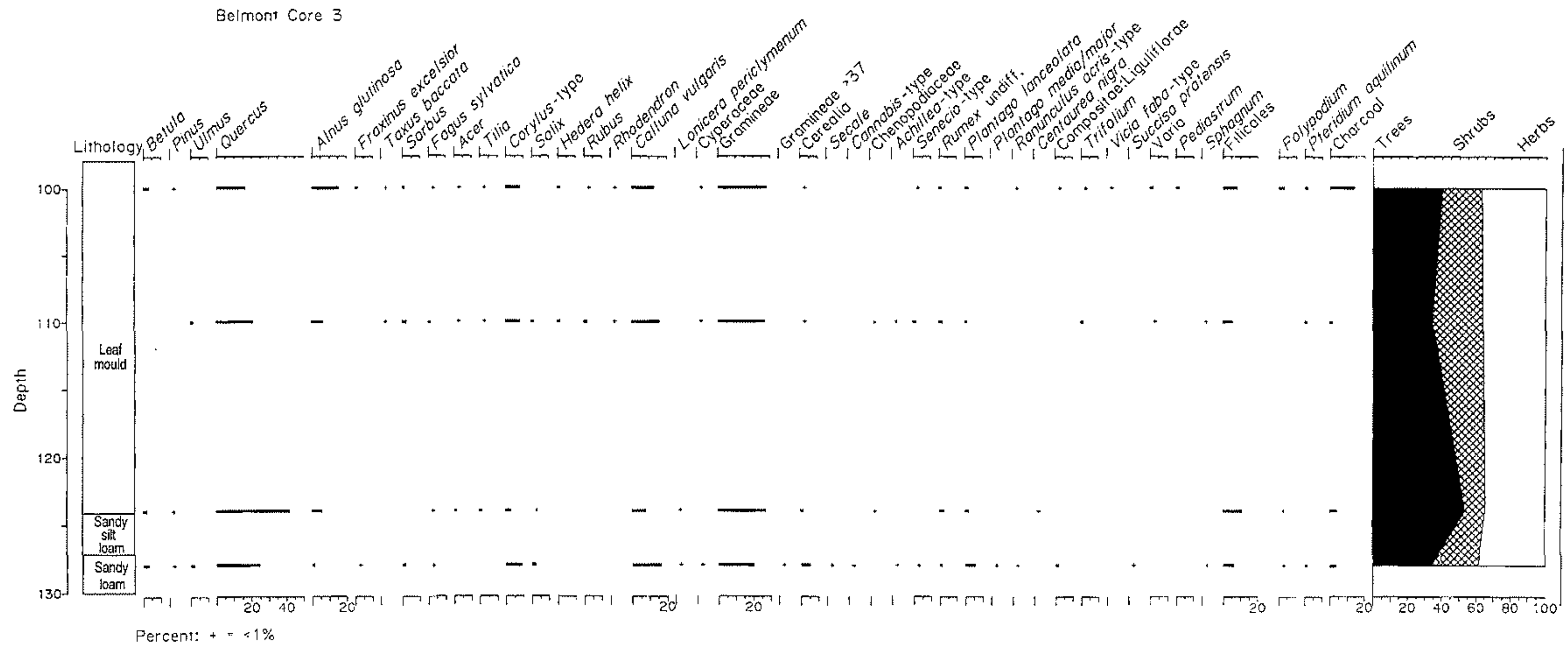

Fig 2. Pollen diagram for the basal section of core 3.

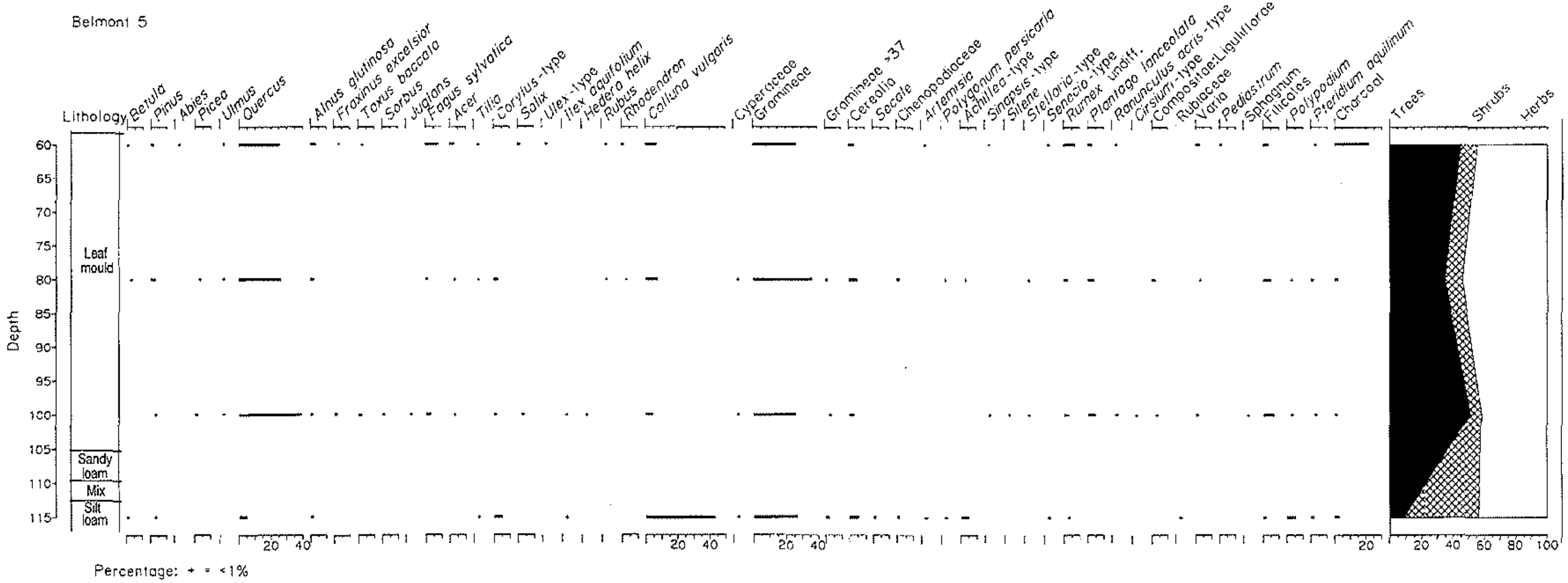

Fig 3. Pollen diagram for the basal section of core 5.

favour ling growth and might well represent the original state before moat construction. If this is correct, then some form of soil amelioration would have been needed to produce suitable conditions for cereal growth. This could have taken the form of liming or, more likely, marling which entailed the digging-up and spreading of local lime-rich clays (see Furness, 1978) improving both the pH and water holding characteristics in one treatment.

5. Conclusions

It is difficult to date the lower sediments in both cores, but in core 5 the bottom 15 cm of organic rich sediments may be contemporary with the original site occupation. The upper sediments in core 5, and probably also in core 3 seem to be much more recent in age - possibly only representing 200 years or less. This would be consistent with some dredging, but not a full clean out. Thus, the environmental history discernible in these cores is at best partially complete, and it is unlikely that further information of value could be gained by additional analyses.

REFERENCES

Canti, M.G (1990) Soil materials from the rampart at Watertower Street, Chester. *English Heritage: Ancient Monuments Laboratory Reports* 130/90.

Furness, R. R. (1978) *Soils of Cheshire*. Harpenden: Soil Survey of England and Wales.

Grimm, E.C. (1992) Illinois State Museum.

King, S.J. (1977) Soils in Cheshire II. Sheet SJ 45E/55W (Burwardsley). *Soil Survey Records* 43. Harpenden: Soil Survey of England and Wales.

Moore, P.D., Webb, J.A. and Collinson, M.E. (1991) *Pollen Analysis*. Blackwell Scientific Publications.