

Assessment of Soil Samples from Woodbridge

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Introduction

This report details the geochemical analysis of soil samples from Woodbridge with the aim of assessing the potential of the soil to inform on anthropogenic activity across the site. Five areas, identified as buildings had undergone extensive soil sampling whilst further samples were taken from areas 'outside' the buildings to act as controls. The analysis was undertaken on a sub set of 47 samples from three transects across the breadth of both buildings 1 and 2 and the samples from the areas on the 'outside' of these buildings. The main aim of this investigation was to establish whether there was a significant difference in the levels of phosphorus between the outside and the inside of the building areas and its distribution pattern within the building area. Additional information on the character of the soil was gained from a consideration of the macro and micro nutrients within the deposits.

The Sample Set

The sample transects across the two buildings were taken from within 2 metres of each end and across the central area. For building 1 these were row sample numbers 124 to 164, 1007 to 1023 and 1203 to 1222 whilst for building 2 they were row sample numbers 22 to 42, 211 to 231 and 524 to 544. Three control samples were taken along each of the long sides of the building areas at a distance of 3 metres.

Analytical technique

Analysis was undertaken using energy dispersive X-ray fluorescence (EDXRF) on the <2 mm fraction. The samples were dried at 50 deg. C, ground to a fine powder and pelletised at a pressure of 15 tonnes. The total phosphorus concentration was measured using a Links System XR300 EDXRF spectrometer employing a Rhodium anode X-ray tube running at 10 kV. The system was calibrated with a suit of 10 multi element soil standards. As the EDXRF system can undertake simultaneous analysis the concentrations of the elements magnesium, aluminium, silicon, potassium, calcium, titanium, manganese, and iron were also determined in order to provide additional information on the character of the sediments.

Results

The full analytical results are shown in table 1. In general the overall levels of phosphorus are relatively low, perhaps reflecting a low level of anthropogenic activity across the site or a relatively short period of activity. The concentration ranges for the major and minor elements are narrow suggesting little variation in soil type throughout the samples.

Initial appraisal of the results in terms of the aims of the assessment was undertaken by plotting the mean and standard deviation of the samples from each transect and control set. The results are shown in figure 1. It can be seen that there is a clear difference

between the interior of the buildings and the control samples from the exterior of building 2. The difference between the interior and the exterior of building 1 is not so marked however it is significant.

Figure 2 shows the phosphorus distribution across each transect, plotted at two metre intervals. This indicates not only the general level of enhancement within the building area but also the significant variation in phosphorus concentrations across the transects. This tentatively suggests the existence within the buildings of zones of different activities or different levels of activity.

Conclusions

The assessment has shown that there is a significantly different geochemical signature within the interior of the building areas as opposed to the exterior. In addition the variation observed across the transects suggest the existence of zones of activity within the buildings.

The initial results are encouraging and as the five similar building areas have been extensively sampled there is present a unique opportunity for further more detailed analysis to construct. The proposed further analysis would be a two stage process with stage 2 relying on the outcome of stage one.

Stage One

This work would examine the distribution patterns of phosphorus across all five areas to identify any consistent zoning within the areas which could be attributable to anthropogenic activity. This would be supported by examining the variation in the major and minor elements and undertaking magnetic susceptibility measurements to aid identification of particular features such as hearth etc.

This would require the analysis of the samples taken on a one metre grid across the five areas. A total of 720 samples.

Stage Two

If stage one produced positive results then this stage would examine the distribution patterns across buildings 1 and 2 in higher spatial resolution. This would require the analysis of a further 1200 samples providing a spatial resolution of 0.5 metres.

Costings

Stage One

	No. of samples	Cost
Geochemical analysis for 11 major and minor soil elements including phosphorus plus report	720	£4,560
Magnetic susceptibility plus report	720	£2,560

Stage Two

Geochemical analysis for 11 major and minor soil elements including phosphorus plus report	1200	£7,200
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The above costs do not include VAT

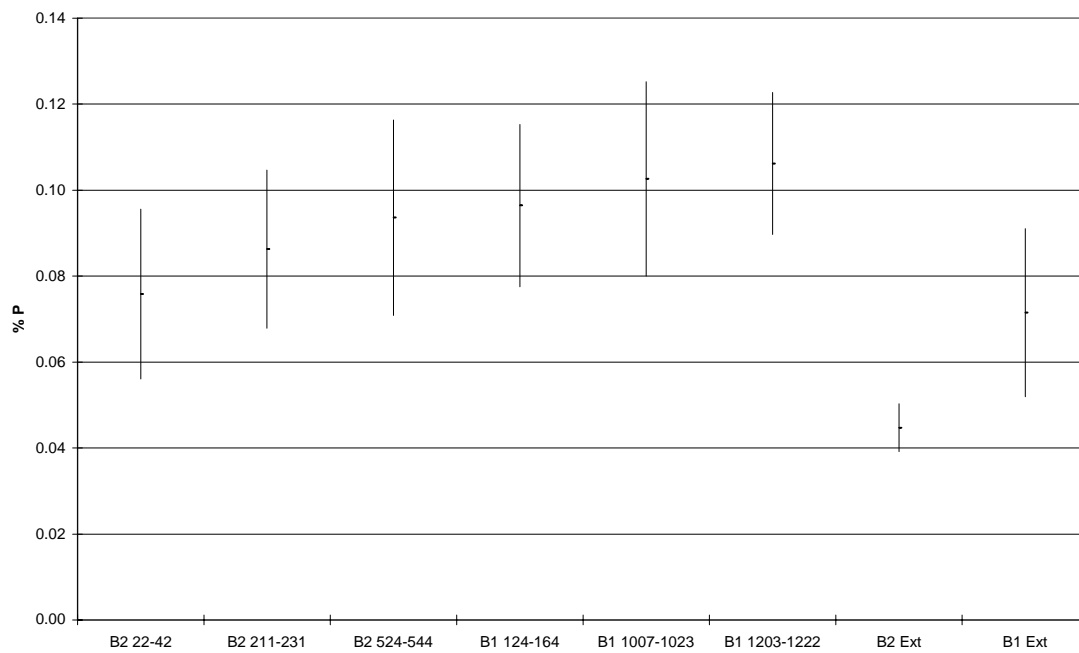


Figure 1. Plot of the mean and standard deviation for phosphorus for each sample transect.

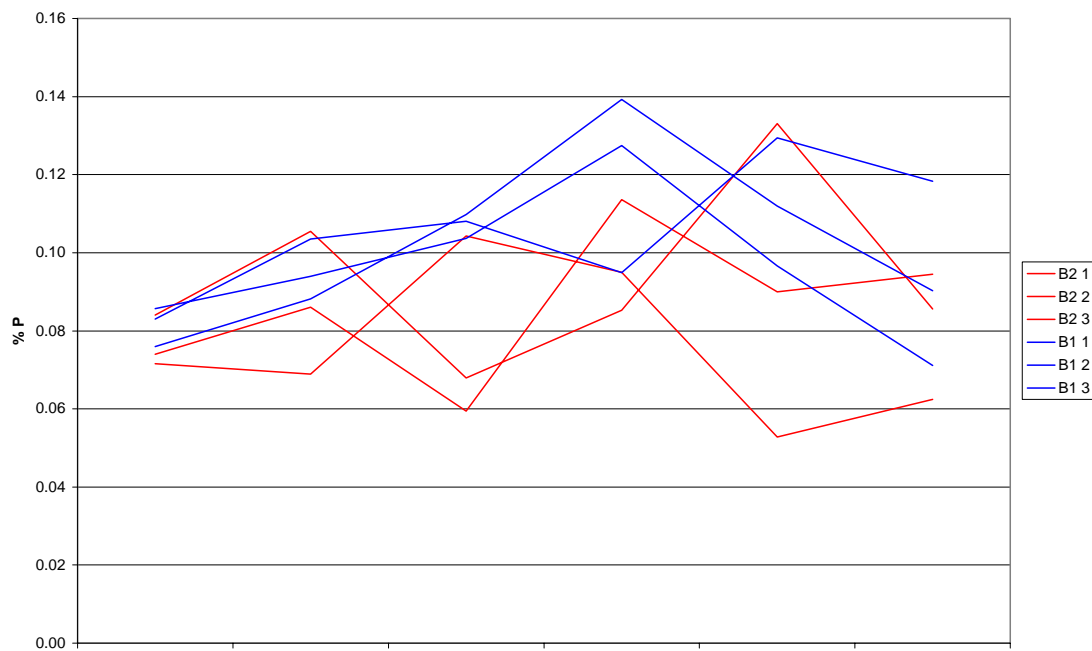


Figure 2. Plot of phosphorus levels across the three transects from building 1 (B1) and building 2 (B2). Variation across transects implies zoning of activities.