CONSERVATION ASSESSMENT FOR BERMONDSEY ABBEY
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Conservator: Dana Goodburn Brown, Kirsten Suenson-Taylor
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The following assessment of conservation needs for the accessioned and bulk finds from the excavations at Bermondsey Abbey (BA84), encompasses the requirements for finds analysis, illustration, analytical conservation and long term curation. Work outlined in this document is needed to produce a stable archive in accordance with MAP2 and the Museum of London's Guidelines.

INTRODUCTION

Conservation support at the time of the excavation was provided by conservators working for the MoL Department of Greater London Archaeology. Conservation of artefacts was carried out in the laboratory and on site. Conservators were also involved on site to give advice on the processing of artefacts, as well as carrying out lifting procedures for fragile or complex finds. Unfortunately some records of treatments carried out on site cannot be located although general methods used are known. All other conservation records are held at the Museum of London.

SUMMARY OF CONSERVATION WORK

2979 registered finds were recorded, quantified by material as follows:

Material	**No. Accessioned**	**No. Conserved** (approx. numbers)	**No. to be treated** (see below)
Wood	16	16	
Fibre	4	4	
Bone	93	50	4
Copper alloy	617	200	86
Silver	16		
Lead	141		73
Iron	513		40 + additional x rays
Glass	502		31
Ceramics	822		
Flint	166		
Stone	137	4	4

Treatment of objects at the fieldwork stage includes the stabilisation of vulnerable materials and composites, cleaning of coins for dating purposes and investigative cleaning and conservation according to archaeological priorities. Treatments were carried out under the guiding principles of minimum intervention and reversibility. All conserved objects are packed in archive quality materials and stored in suitable environmental conditions.

ASSESSMENT OF CONSERVATION WORK OUTSTANDING

The small finds were assessed by visual examination of both the objects and the X rays, closer examination where necessary was carried out using a binocular microscope at high magnification. The small finds were reviewed with reference to the small finds assessment by Geoff Egan.

PREPARATION FOR DEPOSITION IN THE ARCHIVE

The glass is generally in stable condition, although 31 glass items appear especially unstable. However, much of the glass has become discoloured in burial obscuring any decoration. The glass generally has a dark brown deteriorated surface with an internal core of bright coloured glass in thick layers. Occasionally the internal layers are very thin and laminated. Some of the glass needs better packaging to protect the material in long term storage. Further investigation work to visualise and analyse the glass assemblage is outlined below. Stabilisation of the vulnerable glass will take 3 days.

85 copper alloy finds were found to be unstable and the following vulnerable finds should be repackaged <472>972; <470>2937. Treatment and stabilisation of these finds should be carried out in consultation with curators or finds specialists.
4 days

One copper alloy object <543>4154 has had a mould taken in plasticine- this mould needs to be packaged and stored separately in case breakdown products are harmful to the metalwork. It would be advisable to run an accelerated ageing test ('Oddy' test) on the plasticine to determine its permanence and the potential of the material to cause deterioration of artefacts. 1.5 day

Iron artefacts were reviewed in close conjunction with their x-rays. Most of the iron is stable albeit within a thick corrosion crust. Approximately 40 iron artefacts have changed in appearance from time of x-ray and appear to be actively corroding, delaminating, or spalling. Improvement of packaging and maintenance of desiccated storage conditions is needed in the majority of cases, however some active treatment and stabilisation will be necessary. 4 days
Approximately 10 iron items need to be re x-rayed, some 7 items which have been reaccesssioned need to have their numbers changed on x-ray plates and x ray index.

18 lead finds and all of the 55 lead canes showed some degree of corrosion.
3 days

4 items of Roman shale although previously treated were found to need further consolidation. Shale is a particularly problematic material and the treated items may need controlled environment storage after treatment. 2 days

Many of the bone and ivory finds had been treated at fieldwork state and the bone is generally in good condition. However 4 ivory finds need treatment to arrest splitting and delamination: <959>2987; <2286>286; <1614>386; <2257>454
2 days

Total **19. 5 days**

FINDS ANALYSIS

Glass: Many hundreds of fragments of highly deteriorated glass were recovered. It is possible that much of this glass is decorated but details have become obscured by burial contaminants and deterioration products. There is much potential for conservation work on this material to assist finds research. In particular, it is important to identify the original colours of the glass which may have been altered by leaching and oxidation and obscured by the presence of iron and manganese salts. The original colour is therefore not easy to distinguish. The identification by X ray fluorescence (XRF) of elements used to colour the glass may be possible. It is unfortunate that the deteriorated glass is not sufficiently crystalline to allow the use of X ray diffraction (XRD). In other circumstances this technique could be used to distinguish compounds and how they have altered either in burial or *in situ* as a result of contemporary pollution or heat. Exactly how much of the assemblage should be analysed will have to decided in consultation with the finds specialist. Analytical work on a selection of the glass might take 2 days.

Investigation of decorative motives of deteriorated window glass is problematic. Previous research looking at XRF, cleaning techniques and beta-backscattering x-rays has been carried out at the Museum of London, and found to be largely unsuccessful. The use of xero-radiography has been more successful at detecting decorations. However areas of deterioration are also detected and this may obscure designs. Further work by Barry Knight at English Heritage has had some success in visualising glass decorations (Knight 1996). These techniques are still experimental and have not yet been applied as standard practice. It is possible however that this method might be explored. The technique involves use of a chelating agent to remove iron (III) and manganese (III) salts which are darkening the glass and obscuring the pattern. It transforms black opaque glass to white opaque glass but in a solution of correct refractive index (typically a mixture of acetone and toluene) the decoration can be seen. The question arises however as to whether it is right to use this technique. Is the chelating agent removing more than burial contaminants and alteration products? The suggested agent may also remove calcium and magnesium ions from the glass, and certainly the finished artefact is weakened by the treatment. The glass is much altered and this treatment does not fit with any principles of minimum intervention. Furthermore, unless placed in solvent the decoration is still obscure, thus in order to see the decoration future researchers will have to immerse the glass in solvent again. This in itself will be damaging to the glass as deterioration crusts may be lost in the process. However this may be the only way to see designs and to obtain the information. Use of the technique should therefore proceed cautiously in close consultation with finds researchers.

Given the large quantity of material it will be necessary to identify important contexts for investigation and then rapidly screen the material using xero- radiography for potential. Once this is done resources can be utilised to visualise any decoration for drawing etc.

10 days

Glass- Total 12 days.

It is anticipated that a large number of artefacts will be identified for investigative cleaning and analysis to assist finds research. At present items have only been identified in terms of their intrinsic importance to the project and conservation involvement has not been fully defined. This will be resolved as work continues. In particular a group of iron knives a number of which have makers marks, secondary metals and mineral preserved organics may warrant further investigation. The following 9 copper alloys appear to have plating or gilding, analysis by X ray fluorescence (XRF) should be carried out to confirm this:
<403>1; <884>3376; <517>972; <813>235; <913>4154; <860>972; <406>2706; <388>1; <499>1 Total 10 days

Finds Analysis Total 22 days

POTENTIAL FOR CONSERVATION RESEARCH
These projects would be worthy of publication in the conservation literature.

Copper alloy. The assemblage at Bermondsey Abbey presents a good opportunity to assess the level of instability of copper alloy objects more precisely, and identify the corrosion products. A selection of 'unstable' copper alloy corrosion products could be analysed by X ray diffraction (XRD). This would allow the identification of the corrosion product and quantification within mixtures of corrosion products, allowing investigation of the critical processes of deterioration in the buried environment and in post excavation storage. The study would require 4 days to research/design selection policy and a further 4 days to analyse results/write report. Costs of c.£100 per sample would be incurred. Approximately 20 samples would be required.
Total 8 days + £2000

Plasticine mould. As mentioned above the plasticine mould of a seal <543>4154 has been included in the packaging of the object itself. The artefact appears unstable, and the plasticine mould itself may be responsible for this. Analysis of the corrosion products should be carried out to confirm this hypothesis alongside accelerated ageing tests on samples of the plasticine itself. Cost of an accelerated ageing test are included above. Additional costs to analyse the corrosion products would be 1.5 days plus a fee of c.£100 for XRD analysis

Total 9.5 days + £2100 costs

CONTRIBUTION TO THE PUBLICATION
Results of analysis and investigative conservation should be included in the final publication. 2 days

Task	Time Required
Analysis and investigative work	22 days
Stabilisation for the archive	19.5days
Conservation research	9.5 days + £2100 costs
Contribution to the publication	2 days
Total	**53 days + £2100 costs**

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