
Author	Maloney, Cath. LAARC
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2.5 Environmental material (Ecofacts)

This section deals with the very diverse range of biological, botanical and other material (termed ecofacts) which, together with their associated records, form the environmental archive. It is arranged as follows:

- 2.5.1 General (policy, terminology)
- 2.5.2 Animal bone
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 - 2.5.11.1 *Desk-based assessments and geoarchaeological summaries and surveys*
 - 2.5.11.2 *Environmental post-excavation assessment report*
 - 2.5.11.3 *Specialised analyses, reports and publications*

2.5.1 General

Procedures for collection and retention, sampling and processing, are summarised here in so far as they concern the form and character of the archive that should be deposited. For methods to use on site, and for advice on general policy, contractors should refer to *Environmental Archaeology: A guide to the theory and practice of methods, from sampling and recovery to post-excavation* (English Heritage, Centre for Archaeology Guidelines, 2002, and The Institute of Field Archaeologists' (IFA), Standards and Guidance for archaeological materials, 2001).

The Museum of London will **only** accept environmental samples whose potential has been assessed (as defined in *Management of Research Projects in the Historic Environment, The MoRPHE Project Managers' Guide* (English Heritage 2006, 1.1 and 2.3.4) and in the first part of these *Standards*, Sections 1.1 – 1.4) – that is, they have been identified and listed. Un-assessed samples will **not** be accepted, though an exception may be made if a sample has the potential to contribute to wider research aims than those covered by the project that produced it. Unproductive environmental samples should be documented (**Finds or Ecofacts Inventory** 2.3.4.1) and discarded.

To facilitate searching across all archives deposited in its care, as with finds, the Museum of London is particularly concerned to ensure that ecofacts are recorded to a common standard. Contractors should adhere as far as possible to agreed term-lists for ecofact names (<http://www.collectionstrust.org.uk/archobj/archcon.htm>) and use NMR Archaeological Sciences Thesaurus (http://www.fish-forum.info/i_lists.htm) for material type, investigative techniques, method of recovery etc.

Please note that the LAARC should be notified when material is being considered for destructive analysis.

Each group of ecofacts will be considered in three parts:

- collection and deposition
- the basic record (recorded as part of the fieldwork); this includes entry on the Ecofacts Inventory (see 2.3.4.1) and the Appendix in this section.
- assessment and analysis records (usually carried out during post-excavation assessment and analysis stage for the preparation of a report).

2.5.2 Animal bone

2.5.2.1 Collection

All animal bone should normally be recovered and deposited, provided that it is stratified. Hand collection will often be supplemented by selective sieving, but the two bodies of material produced must be kept separate, and the portion retrieved by sieving must be labelled appropriately (Section 2.6.11).

2.5.2.2 Basic records

The presence of animal bone in a context must be recorded in the Finds Inventory (Section 2.3.4.1). It may also be recorded as part of bulk finds cataloguing.

2.5.2.3 Assessment and analysis records

More detailed recording, usually carried out during post-excavation assessment, must be in digital as well as paper form (as a spreadsheet or database; see Section 2.7.5), and should consist of records with the following structure:

- Context number
- Categories of material present:
- Species or large mammal, small mammal: bird, fish, amphibian, reptile
- Age
- Pathology
- Butchery
- Measurements
- Basic quantification by weight
- Fragmentation
- Fragment number
- Method of recovery
- State of preservation

Latin names and up-to-date taxonomy should be used in recording systems.

In the case of very small sites or evaluations, the **minimum** required by the Museum of London is a catalogue by context of total weight and species present.

2.5.3 Human bone

2.5.3.1 Collection

A Ministry of Justice *Exhumation Licence* is normally required before burials are excavated, and this **must** be included in the correspondence deposited in the Project Planning Archive (Section 1.1). For guidance on this and all other matters relating to human remains, both on and off-site, see English Heritage 2002 and English Heritage and The Church of England 2005.

Unless there is a requirement for immediate reburial, the archive deposited with the Museum of London should normally consist of the following:

- All stratified articulated inhumations and a statement about completeness
- All recognised cremations, pyre debris and associated residues
- A variable amount of bone from stratified disarticulated inhumations. (Unstratified disarticulated remains will normally be reburied without detailed recording; stratified remains suitable for retention and further study should be identified at the Post-excavation Assessment stage (2.5.8))

Depositors should note that reburial is their responsibility; but the Museum must receive as part of the archive a record of the material and details of the location of the reburial site.

2.5.3.2 Basic records

An example of a context record sheet for human skeletal remains can be found in the *Archaeological Site Manual* (Museum of London 1994, fig 37). Original record sheets, any drawings made on site and any photographs taken on site must be archived. Care must be taken to ensure full cross-reference between context sheets, the Sample Register (Section 2.5.5) and x-rays (2.4.2.2), when sampling has taken place in association with burials – for example, cremation remains or to recover stomach contents. The presence of human bone must be recorded in the Finds Inventory (2.3.4.1).

2.5.3.3 Assessment and analysis records

More detailed information must be provided by a qualified osteologist about all inhumations and cremations that are deposited in the archive. Whenever possible, this should be in digital as well as paper form (as a spreadsheet or database; see Section 2.7.5), and should consist of records with the following structure:

For cremations:

- Context number
- Weight by context
- Statement of potential for full identification (including age and sex where available)
- Colour (*not mandatory for small projects*)
- Fracture type (*not mandatory for small projects*)
- Fragment size (*not mandatory for small projects*)

For inhumations:

- Context number
- Age
- Sex
- Preservation state and degree of completeness
- Obvious pathologies

For inhumations or cremations:

- Destructive sub-sampling, for example, DNA/Isotope analysis together with reasons

In many cases – especially with inhumations – much more detailed analysis may have been carried out, recording the presence or absence of particular skeletal elements and their state of preservation (eg as on the sheet referred to above). The form in which this information is provided is at the discretion of the depositor; analysis may include, for example, a series of record sheets. The methodology and any database structures must be fully documented and appropriate terminology employed. Likewise, any sub-sampling that has been undertaken by specialists must be fully documented and the results form part of the archive.

The Museum of London follows recommended professional standards. The methods used to determine age, sex, stature and skeletal indices and the descriptions of how skeletal and dental pathology is classified, diagnosed and recorded are available (*Osteology method statement*, 2008. Published online at:

[http://www.museumoflondon.org.uk/English/Collections/OnlineResources/CHB/AboutUs/WOR
Ddtb.htm](http://www.museumoflondon.org.uk/English/Collections/OnlineResources/CHB/AboutUs/WORDdtb.htm))

2.5.4 Shell: marine, non-marine and eggshell

2.5.4.1 Collection

Large dumps of marine mollusc shells should be sampled, but individual shells from individual contexts will rarely need to be collected or deposited with the archive. Terrestrial, freshwater and eggshell from samples should be deposited in the archive.

2.5.4.2 Basic records

The presence of shell in a context must be recorded in the Finds Inventory (Section 2.3.4.1) or, if preferred, a separate Ecofacts Inventory (continuing the box numbering sequence (see appendix of this section).

Sample sheets for specific samples, eg, mollusc columns, must be deposited

2.5.4.3 Assessment and analysis records

More detailed recording, usually carried out during post-excavation assessment, must be in digital as well as paper form (as a spreadsheet or database; see Section 2.7.5), and should consist of records with the following structure:

- Context number/sample number
- Categories of material present
- Basic quantification by weight
- Fragmentation
- Fragment number
- Method of recovery
- State of preservation

In the case of very small sites or evaluations, the **minimum** requirement is a catalogue by context of total weight and species present.

2.5.5 Sample records

A register of all environmental samples must be kept during fieldwork. It must be deposited in digital form (as a spreadsheet or database; see Section 2.7.4), with accompanying printout, and should consist of records with the following structure:

- Context number
- Sample number
- Type of sample
- Volume
- Processing method

2.5.6 Plant macro remains

2.5.6.1 Collection

Decisions about dating and residuality can rarely be made accurately on site, and so post-excavation assessment is essential to ensure that the correct samples are selected for further analysis. So far as the archive is concerned, the Museum of London expects that the flots and sorted residues from the selected samples will normally be deposited after analysis, to permit re-identification or re-interpretation in the future.

2.5.6.2 Basic records

All plant macrofossil identifications should be recorded on proforma sheets or lists (paper or digital). The presence of plant macrofossils and their sample number must be recorded in the Finds Inventory (2.3.4.1) or, if preferred, a separate Ecofacts Inventory (continuing the box numbering sequence (see appendix of this section).

2.5.6.3 Assessment and analysis records

More detailed recording, usually carried out during post-excavation assessment, must be in digital as well as paper form (as a spreadsheet or database; see Section 2.7.5), and should consist of records with the following structure:

- Quantification
- Categories of material (seeds, grain, chaff, nuts, stones, leaves, twigs, wood etc)
- State of preservation
- Waterlogged/dry

2.5.7 Sediment and soil samples

2.5.7.1 Collection

Samples of the sedimentary matrix of the site may be taken as loose soil – in a small sealable jar or phial contained within a plastic bag. Monoliths will **not** be accepted for long-term storage.

2.5.7.2 Basic records

When a sample has been taken, this must be recorded on:

- The Context Sheet (Section 2.1.4)
- An Environmental Sample Sheet (see Appendix 7a-b) or specific record sheet

- The Sample Register (2.5.5)
- The relevant section drawing (2.1.7). This may be deposited with the sample records as either a cross-reference to the section number, or as a photocopy of the section (or part).

The choice of samples for analysis must be fully documented in the Environmental Assessment Report (2.5.11).

2.5.7.3 Assessment and analysis records

More detailed recording, usually carried out during post-excavation assessment, must be in digital as well as paper form (as a spreadsheet or database; see Section 2.7.5), and should consist of records with the following structure:

- Proforma/record sheets of descriptions and the analysis of scientific analysis, such as loss-on-ignition or particle size analysis
- Thin sections
- Photographs (including x-rays)
- Record of sub-samples, ie pollen slices

The methods of processing and analysis will depend on the specialist and the research questions posed, producing a variety of different records. All data and reports should be deposited (2.5.11), and databases or spreadsheets must be accompanied by a full explanation of their structure.

2.5.8 Micro remains

2.5.8.1 Collection

Micro remains, such as pollen, diatoms, ostracods, foraminifera, insects etc, will normally be retrieved from sediment samples (one sample may be suitable for both analyses).

Any remains recovered from processed samples or thin sections should be deposited in the archive.

2.5.8.2 Basic records

Processed micro remains should be recorded in the Finds Inventory (2.3.4.1) or, if preferred, a separate Ecofacts Inventory (continuing the box numbering sequence (see appendix of this section). See Section 2.6.14.3 for storage media.

2.5.8.3 Assessment and analysis records

Detailed recording, usually carried out during post-excavation assessment, may be in digital (see Section 2.7.5) as well as paper form. Records should include:

- Identification lists (number by species per sample)
- List of categories, ie, pollen (arboreal, herbs, marsh); diatoms (freshwater, marine, brackish)
- Method of recovery/preparation
- State of preservation

Microscope slides, if prepared, should be deposited.

2.5.9 Wood samples (including timber, charcoal and dendrochronological samples)

2.5.9.1 Collection

- Structural timbers should normally be recorded *in situ* and sampled for dendrochronology and species, if they form part of a well-stratified structure. When large, well-preserved structures are found, which have a potential for public display, contractors must liaise with the Museum of London at an early stage.
- Loose timbers – as opposed to smaller wooden artefacts, which must be treated as Registered Finds (Section 2.3.4) – should also be sampled whenever possible, because they can often be assigned to structures during post-excavation analysis.
- Wet wood from flots or residues should be sampled for species (see 2.5.6). Identified remains may be deposited; unidentified remains should be discarded.
- Samples themselves must not normally be retained for deposition in the archive, except charcoal, which should be retained. In the case of evaluations and projects that do not proceed to or beyond post-excavation assessment, unanalysed - but stable - samples will very occasionally be accepted by the Museum if there is evidence that they have the potential to be used in the context of research wider than that of the immediate project. The reasons for this must be documented in the project archive.

2.5.9.2 Basic records

The presence of charcoal in a context must be recorded in the Finds Inventory (Section 2.3.4.1).

An example of a context record sheet for recording structural timbers can be found in the *Archaeological Site Manual* (Museum of London 1994, fig 31). Original record sheets, and any drawings made on site, must be lodged with the archive.

All timber and dendrochronological samples must be recorded on:

- The Context (Timber Recording) Sheet (Section 2.1.4)
- The Sample Register (2.5.5)

2.5.9.3 Assessment and analysis records

All data and reports relating to analysis of the samples must be deposited with the archive. Databases or spreadsheets – whether presented in digital or paper form – must be accompanied by a full explanation of their structure.

Data appropriate to the sample will consist of:

- Wood identification lists
- Dendro/ring measurements
- Felling date
- Preliminary identification and interpretation of charcoal
- Identification sheets, if used

2.5.10 Radiometric dating samples (Carbon-14, Optically Stimulated Luminescence (OSL)*, Thermoluminescence (TL)*, Archaeomagnetic, Amino-acid dating etc.)

2.5.10.1 Collection

Samples should normally have been processed and dated before the archive is deposited. There is no need to retain or deposit the sample itself.

Samples that have not yet been analysed may occasionally be accepted for archival deposition, if a compelling case can be made for retaining them on the grounds of research potential. Contractors should note that unprocessed soil samples are **not acceptable**, and that the sample must be processed and packaged ready for submission to a laboratory (see Section 2.6.13.2); it must be accompanied also by a statement outlining its significance and value.

2.5.10.2 Records

Radiometric dating samples must be recorded on:

- The Context Sheet (Section 2.1.4)
- The Sample Register (2.5.5)
- Sample sheet

All data and reports relating to analysis of the samples must be deposited with the archive. Databases or spreadsheets – whether presented in digital or paper form – must be accompanied by a full explanation of their structure.

2.5.11 Environmental reports and publications

All reports should be deposited both in paper form and digitally (for specification see 2.7.4).

Full bibliographic details should be provided in the Archive Bibliography (see 2.1.19).

2.5.11.1 Desk-based assessments and geoarchaeological summaries and surveys

These should be deposited (see Section 1.1.2 and 1.1.3)

2.5.11.2 Environmental post-excavation assessment report

The Assessment Report is an important document, which:

- Documents the selection of samples for processing, assessment and archival deposition, and acts as a brief for those undertaking assessment work on the project
- Provides the justification for further analysis of the assemblages, and accounts for the reburial of certain categories of human remains

- Assesses the value of the environmental assemblage for the benefit of future users of the archive

Environmental Assessment forms part of the overall Assessment, and so must be carried out with adequate knowledge of the site sequence and dating. The key recommendations should be brought forward into the main report for the site or project (1.3). The report should normally include:

- A summary of the environmental assemblage recovered from the site
- Notes on unusual site conditions, sampling strategies and retrieval techniques
- Preliminary interpretation of the bone assemblages – with, in the case of the animal bone, identification of key deposits and assessment of potential for commenting on site function and usage
- Preliminary interpretation of site formation processes and palaeoecology, where appropriate
- Assessment of key botanical samples and potential for analysis
- Evaluation of the potential of any samples for dating the site adequately
- Evaluation of the potential for palaeoecological – as opposed to cultural - research

The report should be deposited in a suitable archival format (see Section 2.6.4), normally both on paper (2.6.3) and digitally (2.7.4).

2.5.11.3 Specialised analyses, reports and publications

These will be so varied that no specific requirements as to content would be reasonable, but depositors are asked to ensure that:

- Full data are presented
- The report is properly documented with a copyright statement (see Section 2.6.4)
- All drawings and photographic images are properly referenced, if necessary with concordances (see also 2.1.16.2, 2.1.20 and 2.2.3)
- Suitable materials are used for all paperwork (2.6.3)
- A copy or offprint of any publication is forwarded
- Digital versions are provided in an acceptable format with appropriate metadata records (see Section 2.7 for various data format specifications).

Appendix: sample Ecofacts Inventory

Site code: ABC13

Box id	Box Type	No of bags/other container	Context no	Material	Ecofact name	Period or century (if 18th c or later)	Sample number	Description/Comments	Discarded
14	stewart	1	199	Egg shell	Egg shell				
14	stewart	1	199	flot	plant macro remains	Roman	53	HAZARD	
14	stewart	1	199	flot	fish remains	Roman			
14	stewart	1	199	sediment	pollen	Roman	53	waterlogged remains	
15	standard	1	199	sediment	sample	Roman	53		
16	standard	1	199	wood	charcoal	Roman	53		
			202	Wood	RC sample	medieval	54		yes
			256	shell	oyster	medieval	55		yes