

**ASSESSMENT OF THE ANIMAL BONES FROM BERMONDSEY ABBEY (BA84)**

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## Assessment of the animal bones from Bermondsey Abbey (BA84)

### Aims

This assessment will attempt to gauge the potential value of the bone assemblages arising from the various occupation phases at this site. The principal aims will be to establish the worth and extent of information available from the Late Saxon, Monastic and Early Postmedieval periods. Each of the latter two assemblages are related to substantial high status households i.e. the Cluniac/benedictine Abbey and Bermondsey House, while the former bone collection may relate to a possible Late Saxon minster conjectured to be within this area.

### Recovery

Bones were collected by hand and through the taking of bulk samples. The sampling strategy can be described as extensive, with most feature types as well as the various areas of the site represented. A failing of this strategy was the general small size of the samples taken, often less than 1 litre and the majority no greater than 5 litres. Most of the samples were washed through a 1mm mesh, with the exception of a small number of visibly and potentially rich samples, where a 0.25mm mesh was used. With the hand collected assemblages there appears to have been some confusion regarding the recovery (or possibly the storage) of bones from certain postmedieval pitfills. Within the Assessment Application document for this project (Beard and Malt 1994) it was mentioned that the site produced several horncore-lined pits dating to the postmedieval period. No concentrated groups of horncores were found amongst the BA84 archived animal bone assemblage.

### Method

#### *Recording*

The hand collected bones were recorded on INFORMIX using an assessment database designed for the Environmental Section at MoLAS, while the sample bones were recorded onto a WORD for WINDOWS table designed by the author. Both methods involved the recording of various categories of information, as follows:-

#### 1) Hand recovered (see Appendix 1)

- quantity, in terms of weight (in kilogrammes) and approximate number of bones in each context
- state, referring to the levels of preservation and fragmentation
- abundance of major zoological groups, where the bones are divided into large and small mammal (with the definition of 'Large' being sheep-size and larger), bird, fish and amphibian.
- species list.

#### 2) Sieved (see Appendix 2)

This method follows each of the above recorded categories, as well as:-

- the number of bones is essentially limited to the quantity of large mammal fragments (the first number listed under 'Extra information', fishbones (divided into number of bones and number of bones potentially identifiable to species) and other categories/species if they are reasonably well represented.

#### *Analysis of data*

At the time of writing information regarding both the stratigraphical associations and dating of the site contexts was not readily available. Therefore it was thought necessary to proceed with the assessment analysis as follows:-

- 1) a brief description of the overall assemblage regarding quantities and the varying levels of fragmentation/preservation and redeposition of the bone assemblages,
- 2) a detailed study of a selection of contexts.

In 2) the selection aimed at producing a representative sample, incorporating contexts across the site as well as throughout the stratigraphic sequence. The method employed was a selection according to size, where only contexts which produced equal to or greater than 1kg of bones were studied. By this means, the study also incorporated those contexts with the highest potential value i.e. those with large concentrated assemblages. An additional part of this subsection will describe the contents of a few smaller assemblages, each of which reflect an aspect of animal exploitation not shown in the larger selected contexts.

It should be noted that the dating evidence for a number of these contexts was less than complete. Only a proportion (approximately 50%) of the site contexts have been spot dated. The dates/phases applied to the remaining contexts have been calculated on the basis of associated stratigraphy.

The information gathered within these two sections will then be used to determine, by extrapolation assuming the selected contexts are representative, the potential value of the site assemblage. This will be achieved by attempting firstly to establish whether any part or parts of the assemblage are worthy of further study and secondly to determine the level of information which can be expected from the available data.

## Results

### Overall description

A total quantity of 353.23kg of animal bone (or 16,200 fragments) were hand recovered from 703 contexts. Bones were found in all areas of the site, often represented by extremely small assemblages (see Table 1).

Table 1. Distribution of bones by size of assemblage

Weight	Number of contexts	Weight	% of Total: Contexts	Weight
< 0.20kg	395	26.15	56.20	7.40
> 0.99kg	71	210.60	10.10	59.60

All weights are in kilograms.

Fragmentation is generally moderate throughout, with a large proportion of contexts comprising approximately 35 to 50 bones per kilogram (bpk). Larger values of bpk are shown by some of the selected contexts, mainly due to a greater proportion of the bones belonging to smaller species rather than to higher levels of fragmentation. While most of the context assemblages are well preserved, a large proportion are clearly in a poorer overall condition. It is noticeable that the majority of the less well preserved assemblages contained human bone fragments. These were found over a large part of the site, and not just within gravefills. It can be assumed that such fragments were redeposited from the cemetery area situated on the northern part of the excavated area and possibly from a few graves situated to the west of the Infirmary Hall. The presence of scattered human remains is a clear sign of redeposition, which in turn suggests the likelihood of bone damage or loss.

Out of a total number of 315 bulk samples taken, 201 produced animal bones. The latter total represents 188 contexts, of which only 81 contexts (91 samples) have been assessed (see Method). With the exception of a small number of contexts (see Selected contexts), the quantity of bones produced by these samples is very small. To a certain extent these poor results must relate to the small size of the samples (see Recovery). However a number of larger samples also produced relatively few bones e.g. 5 litres of soil from fill [2350], situated within the first great drain, produced less than ten bone

fragments. Conversely just 3 litres from [1315], representing the 13th/14th century fill of a robber cut, provided close to 100 fragments (see Table 2).

The selected contexts

As shown, just 71 context assemblages were greater or equal to 1kg in size (see Appendix 1). These produced 210.6kg of bone (or 9,450 fragments). A rough breakdown of these contexts into the major occupation periods of the site are shown in the following table.

Table 2. Distribution of Selected assemblages by phase

Phase	Number of contexts	Weight of bone	Number of bones	% Total Weight
Roman	2	2.90	140	1.37
Late Saxon	8	25.20	865	11.97
Late Saxon/ early Monastic	8	21.65	790	10.28
Early Monastic	12	30.50	1095	14.48
Later Monastic	11	21.05	695	9.99
Early Postmedieval	12	45.30	3315	21.50
Later Postmedieval	9	28.25	1215	35.13
Poorly dated	8	35.35	1350	16.78

Each of these assemblages is described in turn, from the earliest to the latest (the poorly dated assemblage is generally divided amongst the Monastic and Postmedieval parts of the site).

#### *PreMonastic*

The Roman contexts include a gully fill [851] and a pitfill [1215]. Though the datable material can be taken as a confirmation of date, the gully fill produced a small quantity of human bone fragments and a rabbit bone. The latter species suggests, at the least, an 11th century date for this deposit, while the human bones are likely to have been redeposited from the Monastic cemetery. Alternatively the rabbit may be intrusive (i.e. dating the burrow rather than the overall deposit) and the human fragments may date to the Roman period, as a few early burials were found within the general area of the Monastic ruins. All the bones were well preserved, probably indicating little to no disturbance.

Each of these two assemblages are dominated by cattle, sheep/goat and pig. Both produced a small proportion of domestic birds (chicken), while a few fishbones were found in the gully fill. The domestic mammals are each represented by a wide distribution of skeletal parts and several bones belonging to all three species, though especially cattle, showed butchery marks. This pattern of species representation and bone modification is typical of the assemblages found in the majority of site deposits, from the Roman through to the postmedieval periods. A sample was taken from the gully (see Appendix 2), which produced an assemblage dominated by chicken bones, these accompanied by a few large mammal (sheep and larger), fish and yet more rabbit bones.

A possible Roman deposit is worth mentioning, being ditchfill [3940]. As well as the usual mix of domestic bones, this deposit also produced a single whale vertebra. This bone belongs to one of the smaller whale species e.g. pilot whale.

Most of the Late Saxon through to Monastic contexts were dated by association rather than by spot dates (i.e. all those without dates in Appendix 1). A large proportion of these could not be differentiated from pre-Monastic and Monastic levels, hence the Late Saxon/early Monastic phase. A number of Late Saxon deposits were recognised, these being the two north-south orientated ditches situated beneath the infirmary hall and chapel (SG3/126 and 4/127, with 4.30kg/90 fragments), the fill of a watercourse (SG188, with 7.05kg/220 fragments) in the north-west corner of the site, a dump and two fills within a

drain (5.55kg/200 fragments), and a pitfill (1.05kg/40 fragments). Five out of eight of these context assemblages were well preserved. Those in a poorer condition included the bones found in the watercourse fill [2969]. Coincidentally this context also produced a small number of human bones, which undoubtedly indicates redeposition and a possible causative agent for the noticed damage to the context assemblage. Overall the Saxon hand collected assemblages conformed to the typical site assemblage, as described above, though no fish were found. A slight difference to the Roman levels was the frequent occurrence of horse bones (6 out of 8 contexts), and possibly a decline in the abundance of birdbones. Horse is represented exclusively by relatively large fragments, in three cases by skull/mandible fragments i.e. in two out of three drain deposits [3205] and [2310], and in ditchfill [3362] (SG127).

Sampling amongst these deposits was limited to the drain, with one sample from the dump and ten from the lower fill. Bones were recovered from the dump and four of the lower drain samples. Each of these produced small quantities of large mammal bones.

The late Saxon/early Monastic assemblage was recovered from four silty/sandy layers (probably widespread dumps) roughly situated within the southern half of the site (8.90kg/340 fragments), the fills of three intercutting pits located beneath the dorter (16.00kg/615 fragments) and a ditchfill situated approximately beneath the Infirmary Hall (2.25kg/80 fragments). Again a large proportion of the phase assemblages displayed a poorer than average level of preservation, including two of the larger collections, being pitfills [4229] and [4246]. In addition a mixture of preservation states was noticed in ditchfill [1330]. Human bone fragments were found in two of the dump contexts, only one of which is less well preserved i.e. [4433]. As well as the typical array of domesticates (each of those described above, and including cat and duck), three contexts produced the bones of wild species. Red deer was recovered from dump [209] and ditchfill [1330], and roe deer from pitfill [4222]. Just one of these contexts was sampled [1330], providing a small quantity of fish bones

#### *Monastic*

A large proportion of the early Monastic bones were recovered from the fills of a series of quarrypits (9.55kg/230 fragments) situated beneath the Infirmary Cloister and Hall. These pits (both their excavation and backfills) probably date to the construction period of the monastery. Two buttress construction backfills with 5.05kg/360 fragments also date to this period, while an early use period can be conjectured for the deposit within the first great drain (SG98 with 3.15kg/105 fragments), and the two pitfills (3.50kg/155 fragments) and associated ditchfill and layer/dump (5.10/145 fragments), situated to the south of the Infirmary Cloister and Hall. Seven out of the ten context assemblages are well preserved, two of the less well preserved collections arising from quarrypit fills. A noticeable feature of the bones found in the latter features is their relatively small levels of fragmentation, with bpk values as low as 21 and 23.5 in contexts [775] and [1655]. It was noticed that each of these contexts produced a number of large cattle limbbone fragments i.e. at least 50% complete. Amongst the usual array of species there was a single occurrence of human (in quarrypit fill [1655]), and the partial skeleton of a horse in dump layer [1722]. The latter bones were clearly in articulation when found and consist of several vertebrae and ribs.

Four samples were taken from these contexts, three of which produced bones i.e. [775] and two samples from the drain fill [2257]. These produced very small quantities of large mammal fragments, none of which were identifiable to species.

The later Monastic levels are represented by a series of external dumps/layers (9.85kg/295 fragments) and pitfills (7.10kg/250 fragments), situated adjacent to each of the major buildings and features. In addition a dump and the fill of a drain, both within the reredorter, produced 2.85kg/110 fragments. A final context included in this phase is a robber fill dated to the 14th century AD with 1.25kg/40 fragments. It is conceivable, despite the spot dating evidence, that this feature may be contemporary with the other robber features found at this site i.e. post-dissolution.

There are again a proportion of less well preserved assemblages, plus one collection, from fill [2228], where a mixture of preservation states was noticed. A few assemblages show low levels of

fragmentation, in particular layer/dump[4162] with 14.3bpc. Human bone fragments were limited to one of the dumps [625]. There is the usual overriding presence of the common domesticates, largely confined to the large mammals. Wild species are represented by rabbit and fish. A difference to the normal pattern is shown by the assemblage found within the fill of a robber cut [1302], which was mainly composed of chicken bones. Though large mammals were present these were confined to sheep/goat and pig only. As with the previously described robber fill, this context could date to a later period.

Two samples were taken, from pitfill [1848] and, from the reredorter drain, fill [4154]. Both produced small assemblages, mainly composed of large mammals, with the exception of a few fishbones from the drain. This latter context was described on-site as containing cess, though no such material was found in either the hand collected or sieved assemblages. However this fill did contain the partial skeleton of a cat, a common occurrence in medieval cess deposits.

One sample within this phase did produce a reasonable quantity of bones i.e. robber fill [1315]. Included in this assemblage were a large number of large mammal and fish fragments. The majority of the fishbones are potentially identifiable to species. The size range of the individual fish represented is large, possibly suggesting a mixture of marine and freshwater/estuarine species. It should be noted that the corresponding hand collected assemblage was very small (0.05kg/15 fragments).

#### *Postdissolution*

A large proportion of the bones within this phase assemblage were found in deposits which date to, or are likely to date to, the early dissolution period and the use of Bermondsey House i.e. described as Early Postmedieval in Table 2. The features with bones include a series of robbing fills and pitfills (including a cesspit) generally scattered throughout the site (6.45kg/230 fragments and 9.05kg/310 fragments respectively), the fill of a linear cut (2.10kg/75 fragments) and a large concentrated dump/midden within the reredorter (27.7kg/2,700 fragments). Within these deposits the level of preservation is good with the exception of the two fills within the cesspit (SG534, [4306] and [4308]). In addition one of the pitfill assemblages [3965] is composed largely of human bones (20 out of 25 fragments). Several context assemblages show low levels of fragmentation, in particular the aforementioned pitfill and the cesspit fills.

The major contributor to this phase is the reredorter dump [972], which produced a hand collected assemblage comprising a wide range of domesticates (dominated by the large mammals) and wild species (mainly fish with a small number of rabbit bones). A total of five samples were taken, and one of these was washed through a 0.25mm mesh (sample 502). This produced in excess of 10,000 fishbones, all from small individuals, the majority of which appear to be herring. The other samples provided a great range of species, which by weight favoured the large mammals, but in terms of fragment count were heavily biased towards small mammal (especially rabbit), bird and fish species. Though small fish are represented there is a greater size range compared to the large assemblage described above. The majority of the birdbones belong to the usual domesticates. However they also include teal, pigeon, one or more species from the thrush family and small crow. The pigeons are exclusively represented by juvenile birds, which may suggest they were domestic.

The other contexts in this phase produced relatively typical assemblages, with wild species including rabbit and fallow deer (this from robber fill [1281]). Samples were taken from just one of these contexts, the bottom fill of the cesspit [4308], and this produced a small number of large mammal fragments and the tooth of a small rodent.

Bones dating to the latest phase were recovered from dumps situated over the reredorter (3.45kg/205 fragments), pitfills (9.95kg/300) and the fills of a large tank, probably used in water management (SG452, with 15.29kg/605 fragments). The state of the bones in these contexts is less than good in the upper two fills of the 'tank' ([295] and [313]), in one of the pitfills [493] (this also contained human bones) and within the later of the two reredorter dumps [286]. In addition another pitfill [375] shows a wide range of preservation states. The species range is again fairly typical, with the exception of [295] which is clearly dominated by the smaller of the three major mammalian domesticates, particularly

sheep/goat, and chicken. A number of contexts produced bones belonging to relatively large cattle, including the horncore from tankfill [339] which is clearly from a longhorn type/breed. Horse is represented by a partial articulation (a hindleg) in pitfill [433]. The wild species recovered include rabbit and various fish species, as well as swan, represented by a single bone from tankfill [313]. No samples were taken from these contexts.

There are a few instances of boneworking waste i.e. sawn cattle metapodial fragments from [286] and [339].

#### *Poorly dated*

The major part of this assemblage was provided by the so-called cemetery soils and ploughsoils covering much of the site, which produced 31.15kg/1,210 fragments. Two other contexts can be included here, these being pitfill [3303] and gravefill [3131] with 2.45kg/110 fragments and 1.75kg/30 fragments respectively.

A low potential value has been suggested for each of these contexts based on the likelihood of extreme mixing/redeposition. This is shown principally by the presence of a wide date range, or, if undated, by the presence of extremes of preservation and/or numerous human bone fragments.

The recommended exclusion of these contexts from any further analysis precludes any species or skeletal part description. A sample was taken from one of the ploughsoil deposits [3456].

### Conclusions

#### *Potential for further study*

Any estimate of potential value must firstly discuss the extent of damage caused to the site assemblage following deposition and during excavation. The main aim, as stated in the Introduction, is to see whether the assemblage, or parts of the assemblage, are worthy of further study. The information used is essentially that compiled by the analysis of the selected contexts.

A large proportion of the bone bearing contexts contain redeposited material. This is shown by the wide spread of human bone fragments (referring both to the spatial and temporal dimensions of the site), which, it can be conjectured, arose from the reworking of deposits within the Monastic period cemetery. In addition an equally large proportion of these contexts produced bones where the overall level of preservation is relatively poor. These may represent bone collections which were left on the surface and then incorporated at some later date within the excavated features in which they were found. A clear instance of this deposition pattern is shown by the presence of partial horse skeletons, which were clearly allowed to rot on the surface where they were possibly dismembered by dogs, and a portion of the divided carcass was then buried (either by accident or design).

The degree of redeposition throughout the site can best be seen by a review of the dating evidence. Unfortunately a large number of contexts remain undated. However there are clear instances, mainly within the postmedieval contexts, of wide date ranges, suggesting severe mixing. It should be stated that residual material was found in several other contexts (in each phase), although in these cases the great majority of the sherds are contained within a relatively tight date range (one to two centuries). Indeed most of the spot dated contexts, at least within the selected deposits described in Results, are well dated.

It can perhaps be concluded that the evidence for redeposition does point to a large proportion of contexts which have or are likely to have undergone a serious level of postdepositional damage. Within these contexts can be included a large number of, in particular, the postmedieval deposits (especially the so-called 'cemetery soils'), the gravefills, and a relatively large proportion of the deposits within the Late Saxon and Monastic occupation phases.

Hand recovery will introduce a general bias into the assemblages, mainly regarding the underrepresentation or exclusion of the smaller bones. This can be tested for, to an extent, by adequate sampling. As stated above (see Recovery), the sampling strategy was less than adequate and in consequence the information from the majority of the samples taken will be of somewhat limited value. In effect they can be used to provide information on those species not recovered by hand, and suggest the concentration or otherwise of bones found in individual deposits. They will be less able to suggest, from an objective level, the true extent of species and skeletal parts in these deposits. There are obvious exceptions, in particular the post-dissolution reredorter dump, where a representative sample was achieved by gathering a large volume of soil and by using a finer mesh size on a subsample of the total volume taken.

The major problem with hand recovery is that it may not be undertaken to the same extent in different parts of the site. Poorer recovery will tend to be shown by a bias towards the larger fragments, which generally means a good representation of cattle at the expense of sheep/goat and pig. Within the selected contexts there was some evidence for poorer recovery. However the majority of contexts do not show any clear signs of differential recovery.

In general, it can be seen that the majority of context assemblages are worthy of further study. However the analysis from a large part of the site must necessarily be limited due to the poor sampling strategy employed.

The level(s) of information which can be expected from this data are discussed in the next section.

#### *Research objectives*

The questions listed below refer to the Late Saxon through to Early Postmedieval occupation periods only, following the Research design described within the Assessment Application document (Beard and Malt 1994). Following each question the numbers in brackets are taken from the corresponding research aims listed in this Application document.

#### *Can the faunal evidence be used to suggest the possible status of the local population through time? [3.2.5/13]*

A possible line of enquiry is a study of the presence of particular wild species. Hunting can be viewed during the medieval period as a pastime of the affluent members of society, and the animals caught in this way were exported to the towns to satisfy a relatively small luxury market (Hammond 1993. 17 and 41). It is interesting to note that large wild species were present in the Late Saxon, later Monastic and Early Postmedieval phases, the last two also producing rabbit. The lack of such animals in the early Monastic period may reflect either a dietary preference, or perhaps the downturn in the Priory's financial status prior to its elevation to an abbey in the 14th century AD. That these species are present in the other phases possibly indicates, for the Late Saxon period, the likelihood of a noble's house (or possibly an ecclesiastical establishment) in the vicinity, and for the Monastic and Early Postmedieval periods, confirmation of the known status of the Benedictine Abbey and Bermondsey House respectively.

#### *To what extent can the various phase assemblages be used to determine the organisation and use of animals during the occupation period of this site? [3.2.5/10/17]*

In each phase, with the exception of the later Monastic period, the quantities of bones will be sufficient to produce relatively detailed accounts of species representation, plus the age and size ranges of the major mammalian domesticates. The necessary division of the later Monastic assemblage into approximately two parts (each corresponding to a two century period) will severely reduce the information available for study within a phase which is the least well represented (see Table 2). The topics covered by this information will include the means of supply, and in particular if there is evidence for any on-site breeding of meat animals. Noticeably, the post-dissolution reredorter dump samples produced both juvenile chicken and dove bones, possibly suggesting they were bred in the general area. Dovecotes were a common feature of the medieval manor (Hammond 1993. 17). The age distributions can also be used to suggest if the animals imported by the local population were specifically bred for their meat or whether they were initially bred for some other purpose e.g. wool or milk. It can be supposed that the animals either arrived whole or in parts, the former suggested, as at this

site, by the presence of a mix of skeletal elements. These animals were therefore possibly slaughtered and certainly butchered in the vicinity of this site. Wild animals, it would appear, formed a relatively small part of the diet, with the possible exception of the latest phase, which produced an excessive quantity of fishbones. A large number of fishbones were also found in the later Monastic period, and in both these periods, there would appear to be a wide range of fish species and of fish sizes, probably suggesting the use of river, estuary and off-shore fisheries. The huge quantity of fish from the later period is likely to consist primarily of herring. Very large catches of this species were made in the Thames estuary up to about the mid 19th century (Wheeler 1979:76).

*Can the bones be used to provide information concerning the uses of particular buildings during the Monastic period?*

The bones found within the selected contexts dating to this period would appear to be roughly similar, at least regarding the representation of species and skeletal parts. There is a slight difference concerning the presence of various wild species between phases (as described above), and perhaps some spatial differences are shown by the unusual dominance of sheep/goat, pig and chicken in one context, and a relatively large proportion of fish in another, both dated to the later Monastic period. It is hoped that a more detailed analysis of the Monastic assemblage will reveal other spatial differences.

*How does the information from this site compare with that from contemporary deposits excavated in the general area or within London?*

Relatively few Late Saxon assemblages have been excavated in the general area, the most notable perhaps being that revealed by the Saxo-Norman pits found at Winchester Palace (Rielly 1995). The study of the Saxon material from the Bermondsey Abbey site will greatly increase our understanding of the use of animals in this area of London. On a wider scale the assemblages can be compared with the extensive deposits found at e.g. Bull Wharf (Rielly 1996a) and Westminster Abbey (Pipe 1995). The Monastic levels at this site represent one of seven religious houses excavated in London in recent years. All have produced copious quantities of animal bone, a few of which are available for comparison e.g. St John and St Mary, Clerkenwell (Sidell and Fitzgerald 1996 and Pipe 1996 respectively). The combined evidence from these houses will provide a thorough review of monastic diet. Finally the latest period can be compared to the bones from a house, also in Southwark, of relatively similar status i.e. Winchester Palace (Rielly 1995), and then both within the general area and further afield by large assemblages from a wealth of 16th century deposits e.g. Finsbury Pavement (Rielly 1996b).

## Recommendations

### *Selection of assemblages for analysis*

The research priorities related to this site are principally related with the late Saxon, Monastic and early post-dissolution occupation periods. While the assemblages recovered from the earlier and later periods are certainly worthy of further study, it is necessary to exclude them from any further analysis within the framework of this project. It is recommended that they be incorporated into some future research project(s) within the general area of South Southwark.

It is important to establish, within both the late Saxon and Monastic periods, whether there are any spatial patterns of waste disposal. This is aimed at understanding the possible location or presence of nearby occupation in the earlier period, and the possible uses of the separate buildings in the later period. To achieve this aim it is necessary to examine as wide a distribution of bones as possible. Conversely the post-dissolution assemblage probably consists largely of waste materials emanating from Bermondsey House. There is no obvious need to establish a distribution pattern of waste disposal, and the research questions pertaining to this period can be best achieved by an analysis of the larger concentrated assemblages.

Extrapolating the information available from the >1kg contexts, it can be seen that approximately 68% of the site assemblage is contained within the late Saxon through to early Postmedieval period deposits. These contain an estimated total weight of 240kg of animal bones. It is recommended that the latest period assemblage be restricted to the bones from the concentrated dump within the reredorter and those from the various pitfills, these producing 40kg of bone (a reduction of 40kg to an overall total of

200kg). Amongst the 160kg making up the earlier deposits, there should be a 30% reduction to account for those context assemblages which are likely to have experienced above average postdepositional damage. These include those which are less well preserved and/or contain human bone fragments. In addition it should also include all contexts with relatively few bones i.e. the majority of those with less than 0.20kg of bone. This reduction provides an overall total of 150kg, with approximate totals for each major phase as follows:- Late Saxon - 27kg, Late Saxon/Early Monastic - 24kg, Early Monastic - 35kg, Later Monastic - 24kg, Early Postmedieval - 40kg.

The sample evidence, with the exception of a relatively small number of contexts, is very limited and probably of little value. It is recommended that analysis should proceed for all samples from contexts with chosen hand recovered assemblages (the choice following the criteria described above). There is perhaps one exception i.e. robber fill [1315], where the large sample assemblage has a clearly greater potential value compared to the few hand recovered bones. Regarding the very large quantity of fishbones from one of the post-dissolution reredorter dump samples, it was found that the great majority of the bones are likely to belong to the same species. This sample should therefore be subdivided and a representative portion fully analysed.

#### *Method of analysis*

All the chosen context assemblages will be recorded using a recording database set up on ORACLE at the Environmental Section at MoLAS. The system used allows for the input of various categories of information, as follows:- species, skeletal part, proportion and description of part present (e.g. 50% and distal respectively), various modifications as butchery, burning, gnawing, and the presence of any pathological or non-metrical traits (all of these are recorded in a text field incorporating specific codes), age data (epiphysis fusion and tooth eruption/wear) and size data. The bones included as measurable include the lengths, toothrows, articular ends and bases of the following:- all whole limb bones, fused metapodial and tibia distal ends plus all the late fusing articular ends, horncores and antlers, mandibles and maxillae with a full molar row and any other obviously mature/adult bone fragment. In addition a more detailed fragmentation record is available which takes into account various non-repeatable zones (following Rackham 1986).

The use and calculation of the ageing information follows Schmid (1972), Grant (1975) and Payne (1979), while the majority of measurements are taken from von den Driesch (1976). References for various pathological anomalies and non metrical traits can be found in Baker and Brothwell (1980).

This method will not be used for the fishbones represented at this site. These will be recorded by an external contractor i.e. Alison Locker, who will identify each bone to species (or to a major taxonomic group) and skeletal part and take measurements where possible.

#### Time requirements

The following totals are based on the stratigraphic and dating evidence currently available. Time estimates are likely to change following the completion of the field and finds studies, which will enable a more thorough review of distribution and redeposition patterns. It is likely that this information will result in either the removal of context assemblages from further study or their movement to earlier or later phases within the research periods.

The estimated hand collected assemblage worthy of further study amounts to 150kg (or 6,750 fragments). This will be recorded at an average rate of 5kg or approximately 250 bone fragments a day.

Analysis	hand collected - mammal and bird	29 days
	fish	0.5 days
	sieved - large mammals and bird	3 days
	fish	9.5 days
Report	all (except fish)	25 days
	fish	1 day

Total

68 days

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Appendix 1. Details concerning selected contexts

Context	SG	Context type	Date	Phase	Pres	Weight of bones	Number of bones	L. Mam	S. Mam	Bird	Fish	Species/Comments
851	271	gully fill	Rom	R	1	1.00	80	2	1	2	1	B,O/C,CSSZ,HOMO,R,CH,F
1215	411	pitfill	Rom	R	1	1.90	60	2		1		3DOM,CSZ,CH
27		pitfill	17	PM	1	3.90	180	3	1	2		3DOM,CSSZ,R,CH,GO,OB
234		dem. dump	16/17	PM	1	2.20	175	3	1	2	1	3DOM,CSSZ,R,CH,GO,OB,F
			R									
286		dump - reredorter	18R	PM	MIX	1.25	30	2		1		B,O/C,CSZ,CH,OB (LARGE CATTLE)
295	452	pitfill (?tank)	18R	PM	2	3.24	225	3	1	2		3DOM,E,CSSZ,R,CH
313	452	pitfill (?tank)	18R	PM	2	3.20	95	2	2	2		3DOM,CSSZ,R,CH,GO,SWAN
339	452	pitfill (?tank)	18R	PM	1	8.85	285	3	2	2	2	3DOM,CSSZ,D,C(ART),R,CH,OB,F (LONGHORN CATTLE HC)
375		pitfill	17	PM	1	1.35	40	2		1		3DOM,CSSZ,OB
433		pitfill	17	PM	1	2.50	15	2				B,E(ART)
460		robber cut fill		PM	1	1.00	45	2		2	1	B,O/C,CSSZ,CH,GO,F
493	315	pitfill	18	PM	2	2.20	65	2	1	1		3DOM,CSSZ,HOMO,D,OB
770	403	robber cut fill		PM	1	1.20	55	1	1	2		3DOM,E,CSSZ,CH
2751		cemetery soil	17	PM	MIX	2.35	55	2	1			B,S,HOMO,CSSZ,R
2752		cemetery soil	16	PM	MIX	14.90	550	3	1	2		3DOM,E(ART),HOMO,SSZ,CSZ, D,R,CH
3456	556	ploughsoil	Rom	PM	MIX	7.45	300	3	1	2		3DOM,E,CSSZ,D,CH
			R									
4256		pitfill		PM	1	1.05	40	2				3DOM,CSZ
1		ploughsoil	15-19	Mix	1	3.90	120	3	1	2	1	3DOM,SSZ,HOMO(LOTS),R,CH,GO, DU
539			11-16	Mix	2	1.50	145	3	1	2	1	B,O/C,CSSZ,R,CH,GO,DU,OB,F
625	471	ext. dump	14	M	1	1.80	60	2		1		3DOM,CSSZ,HOMO.CH,GO
649			13/14	M	1	1.65	60	2		2		3DOM,CSSZ,CH,GO
1124		surface	13	M	1	1.00	50	2	1	2	1	3DOM,CSSZ,R,CH,DU
1260		pitfill	14/15	M	2	1.75	60	2	1			3DOM,CSSZ,R
			R									
1302	387	robber cut fill	12/13	M	1	0.15	80	2		2	2	S,O/C,SSZ,CH,OB,F (LOTS BIRDS)

Appendix 1. Details concerning selected contexts

Context	SG	Context type	Date	Phase	Pres	Weight of bones	Number of bones	L. Mam	S. Mam	Bird	Fish	Species/Comments
1759		layer	Rom R	M	2	4.05	110	2		1	1	3DOM,CSSZ,CH,DU,F
1848		fill	13/14	M	2	1.95	60	1	1			3DOM,CSSZ,C
2228		fill of shallow cut	14/15	M	1	2.55	60	2		2		B,S,O/C,CSSZ,CH,GO
2937		fill	14/15	M	1	2.80	130	3	1	2		B,O/C,CSSZ,D,R,CH,DU,GO, OB
3131		gravefill		M	1	1.75	30	2	1			3DOM,CSSZ,D,R
4154		drainfill (cess) - reredoter	14/15	M	1	1.20	50	2	1	1		B,O/C,CSZ,C,CH
4162		layer	14/15 R	M	1	1.05	15	2				B,O/C,E,CSZ
209		layer	11/12	LS/EM	1	2.50	125	3		1		3DOM,E,CSSZ,RD,GO
802	324	silt layer	11/12	LS/EM	1	4.00	120	3	1	2		B,O/C,CSZ,HOMO,C,CH,GO
1096	478	ext. dump	Rom R	LS/EM	1	1.35	55	2				3DOM,CSSZ
1330	477	ditchfill	Rom R	LS/EM	1	2.25	80	2		1		3DOM,CSSZ,DU
4222		pitfill		LS/EM	1	1.40	45	2				B,S,CSSZ,ROE
4229		pitfill		LS/EM	2	12.20	450	3		1		3DOM,E,CSSZ, RD,CH, GO, DU
4246	595	pitfill		LS/EM	2	3.40	120	3				3DOM,CSSZ
4433		layer		LS/EM	2	1.05	40	2				3DOM,CSZ,HOMO
1045	3	ditchfill	11/12	LS	2	3.00	90	2				3DOM,E,CSZ
1373	436	pitfill	10/11	LS	1	1.05	40	2				3DOM,CSSZ
1729		dump	Rom R	LS	1	1.90	90	2	1			3DOM,CSZ,D
2969	188	backfill nat. water cut		LS	2	7.05	220	3	1	2		3DOM,E,CSSZ,D,HOMO,CH,GO
3205		dump over drain		LS	1	1.55	65	2				3DOM,E,CSSZ
3210		upper drainfill		LS	1	1.40	40	2				3DOM,E,CSZ
3211		lower drainfill		LS	2	2.05	95	2				3DOM,E,CSSZ
3362		ditch fill		LS	1	1.30	1	1				E COMPLETE MANDIBLE

Appendix 1. Details concerning selected contexts

Context	SG	Context type	Date	Phase	Pres	Weight of bones	Number of bones	L. Mam	S. Mam	Bird	Fish	Species/Comments
972		dump (reredorter)	15/16	EPM	1	27.70	2700	3	1	3	3	3DOM,E,CSSZ,R,C,D,CH,GO,DU,F (LOTS BIRD AND FISH)
1262	498	robber cut fill	14/15	EPM	1	1.40	60	2	1	2		3DOM,CSSZ,R,CH,DU
1281		robber cut fill	13/14	EPM	1	1.25	40	2		2		3DOM,FD,CSSZ,CH
2179	608	rubble fill slot	14/15	EPM	1	1.75	25	2		1		B,S,CSSZ,E
2309		pitfill	15/16	EPM	1	2.05	55	2		1		3DOM,CSZ,CH
3035		fill linear cut	16	EPM	1	2.10	75	2	1	1	1	B,O/C,CSZ,R,CH,OB,F
3460		pitfill	15/16	EPM	1	1.40	90	2	1		2	3DOM,CSSZ,D,R,F
			R									
3503		robber cut fill		EPM	1	1.10	50	2	1	1		3DOM,CSSZ,R,CH,GO
3965		pitfill		EPM	1	1.00	25	2				B,O/C,CSSZ,HOMO(LOTS)
3974		pitfill	15/16	EPM	1	3.30	80	2		1		B,O/C,CSSZ,GO
			R									
4089		pitfill		EPM	1	1.30	160	2		2	2	3DOM,CSSZ,CH,DU,GO,OB,F
4306	534	cesspit fill	11/12	EPM	MIX	2.75	50	2		1		3DOM,E,CSSZ,R,CH
4308	534	cesspit fill		EPM	2	1.40	50	2		1		B,S,CSZ,GO
775	458	quarrypit fill		EM	1	6.15	130	3		2	1	3DOM,CSSZ,CH,F
794	458	quarrypit fill	Rom	EM	2	1.05	40	2		1		3DOM,E,CSSZ,GO
			R									
1121		const. backfill	12	EM	1	1.30	60	2	1	2		S,O/C,CSSZ,C,CH
1122		const. backfill	12	EM	1	3.75	300	3	1	2	1	3DOM,CSSZ,H,CH,GO,OB
1339	318	pitfill		EM	1	2.40	115	3	1	1		3DOM,CSSZ,D,CH
1391		pitfill		EM	1	1.10	40	2				3DOM,CSSZ
1655	261	quarrypit fill		EM	2	2.35	60	2	1			3DOM,E,CSSZ,HOMO,C
1706	273	ditchfill		EM	1	3.05	80	2				3DOM,E,CSZ
1722		layer		EM	1	2.05	65	2				B,E(ART)
2257		drain fill	11/12	EM	2	3.15	105	3				B,S,O/C,E,CSSZ
3303		pitfill		>Mod	1	2.45	110	2	1	1	1	B,O/C,CSSZ,R,CH,OB

Contexts chosen according to size (>1kg of bone), or if unusual (see Method of analysis)

Appendix 1. Details concerning selected contexts

Context	SG	Context type	Date	Phase	Pres	Weight of bones	Number of bones	L. Mam	S. Mam	Bird	Fish	Species/Comments
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## Appendix 1. Details concerning selected contexts

### Key to Appendix 1.

Date - e.g. 14R 14th century AD with some residual material. Rom Roman.

Phase - R Roman, LS Late Saxon, EM Early Monastic, EPM early postmedieval.

Weight - all weights in kilogrammes.

L.Mam, S.Mam - large and small mammal with large equal to sheep and larger. Numeric categories used, 1. 1-9; 2. 10-99; 3. 100+

Extra information - species list, B cattle, O/C sheep/goat, S pig, 3DOM each of the latter species, E horse, CSZ and SSZ cattle- and sheep-size fragments

(CSSZ both sizes of fragment), RD red deer, D dog, C cat, R rabbit, HOMO human, CH chicken, GO goose, DU duck, OB other bird (identifiable), F fish.

Appendix 2. BA84 bones from samples (selected contexts).

Con	S.No	Wt	Pres	L.Mam	Bird	Fish	Extra information
775	47			1			
851	52	0.05	1	1	2	1	4(B+O/C)CSZ,R,CH25,F2.2
972	460	1.55	1	3	2	2	200(3DOM)CSSZ,C,D,R30,CH40,GO, DOVE,OB,F15.11
972	461	0.01	1		2	3	R40,CH,DOVE,OB,F120.80
972	491	*	1			3	RO,F150.120
972+	502	2.00	1			3	F10000.8000
972	503	0.80	1	3	2	3	120(3DOM F/N+PIG)CSSZ,RD,?FD,DSZ R,RO,F120.80,CH,GO,TEAL,OB
1125+	98	0.01	1	1	1	2	1(O/C)RO,PASS,F50.45
1125+	99	0.01	1	1		1	8(O/C-RAD/ULN ART)SSZ,F7.2
1125+	100			1			
1215	116			1			AMPH6.0
1315+	129	0.25	1	2		2	50(B+S)CSSZ,F40.30(MIXED SIZES)
1330	138			1		1	F2.2
1848	330			1			
1992	379			1			
1995	381	*	1		1	1	CH,F3.2
1995	383			1			
2257	427	*	2	1			2.SSZ
2257	447			1			
2350	446			1			
2350	490	0.01	1	1		1	4.CSSZ,F1.0
3205	1271			1			
3211	1071	0.03	1	1			7.(B)CSZ
3211	1344			1			
3211	1518			2			
3211	1521			1			
4154	1745	0.01	1	1		1	9(O/C)SSZ,F5.0
4307+	1836	*	1				1(S),CESSY
4308+	1837			1			

Samples sieved through 1mm mesh unless marked with +, where a 0.25mm mesh was used.

Weights all in kilogrammes. \* weight less than 0.01kg.

For information codes/abbreviations used see Table 1.