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Environment and activity in the Coppergate area of York in the post-Conquest period: draft post-excavation project design

by

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Summary

Following assessments of the bio- and geoarchaeological potential of samples of deposits of post-Conquest date from a number of sites in the Coppergate-Piccadilly-Pavement area of York, a post-excavation project design is presented. It is proposed that, in addition to reconstruction of the implications of the data at the context and feature level, there should be emphasis on analysis of change through time (especially in the period following the Norman Conquest), of use of space, and of relationships between functional areas in this crucial area of the city.

Keywords: 16-22 COPPERGATE; YORK; PROJECT DESIGN; NORMAN CONQUEST; MEDIEVAL; POST-MEDIEVAL; OCCUPATION DEPOSITS; SEDIMENTS; PLANT REMAINS; PARASITIC WORMS; INSECT REMAINS; MOLLUSCS; TIME TRENDS

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1 **Background**

1.1 *Introduction*

Addyman and Hall (1991) have emphasised the importance of the area of central York between the rivers Foss and Ouse in early medieval period, building on a seminal study by Radley (1971). The particular value of the deposits lies in their deeply stratified and richly organic nature, affording excellent preservation, not only of organic artefacts and wooden structures, but also of a wide diversity of plant and animal remains. The bioarchaeological potential, alone, in this area raises any significant investigations to the level of international importance in the study of the Viking period.

Excavations in the Coppergate-Pavement area of York have provided an important sample of the deposits in this part of the town. The reports on plant and animal remains from Anglo-Scandinavian levels at 16-22 Coppergate and 6-8 Pavement give a baseline for further work on the period. The Anglo-Scandinavian data represent only one part of the long chronological sequence in the area, however, and there is enormous potential for bioarchaeological investigation of the period following the Norman Conquest and, just as importantly, for tracing trends through time from the earliest Anglo-Scandinavian use into the later medieval period. In addition, excavations at other sites nearby provide the opportunity for an analysis of use of space in this part of the town.

This document presents a design for a major investigation of these three aspects: post-Conquest material from Coppergate; time-trends, particularly the transition to the Norman period; and spatial analysis.

Work on post-Conquest material from 16-22 Coppergate forms the core of the proposed project, but it is our contention that it would undermine its academic value not to include at least a modest programme of work on samples from the ABC Cinema site, which is effectively part of the same area of occupation, and from some adjacent minor sites.

Work on three of the sites considered here was undertaken before the introduction of the *Management of Archaeological Projects* scheme for project management (English Heritage 1991), so that no original project designs exist. There are, however, detailed Level III reports for the two major sites (16-22 Coppergate and 22 Piccadilly), and dating and stratigraphic integrity are sound.

1.2 *The 16-22 Coppergate site (assessment: Carrott* et al. *1996)*

1.2.1 **History of excavation and previous work**

Excavations at 16-22 Coppergate, in the heart of the City of York (Figs. 1, 2), were undertaken by York Archaeological Trust, under the direction of Dr R. A. Hall, between 1976 and 1981. Although a very large part of the sequence revealed evidence for intensive occupation in the mid 9th to mid 11th centuries (Anglo-Scandinavian period) and provided a huge corpus of bioarchaeological information (summarised by Kenward and Hall 1995), approximately one-third of the samples collected for biological analysis were from post-Conquest levels, mainly representing the period between the late 11th and 15th centuries. A brief summary of the development of the site at three phases is shown in Figs. 3-5.

Essentially, the sequence consists of over 3 m (at the rear of the site) of deposits representing many phases of construction and occupation, alternating with levelling/dumping, with numerous pits. The transition from deposits assigned to Period 5 (‘latest Anglo-Scandinavian’ occupation) to those from Period 6 is arbitrary, with no clear effect of the

Norman Conquest despite the historical evidence for a major impact on the city in general (examples of the latter which may be relevant to this site are the construction of York Castle and the formation, by damming, of the King's Fishpool, Fig. 7).

A database of information relating to the samples from the 16-22 Coppergate site and their history of treatment within the EAU has been maintained throughout, and YAT have provided a full context listing for post-Conquest material, together with a Level III account for this period (Hunter-Mann, unpublished) and a simple matrix at the level of context groups within tenements (the layout of these in the preceding, Anglo-Scandinavian, period is shown in Fig. 6).

In brief, the importance of the post-Conquest material from 16-22 Coppergate is seen as lying primarily in (a) enabling detailed reconstruction to be made of living conditions and activity, including the site's resource base, in the medieval period; and (b) observing the timing and nature of changes (if any) in site utilisation and living conditions consequent upon the Norman Conquest, and further changes through the medieval period. The corpus of data from Coppergate (and the associated sites) also represents comparative material of pre-eminent value at the levels of the city of York, Britain as a whole, and indeed Northern Europe.

1.2.2 **Condition of the material**

The organic component of the unprocessed GBA material from 16-22 Coppergate appeared in many cases to have undergone decay in storage in the long period between excavation and processing (as much as 20 years for certain samples). Although all of the extant post-Conquest samples were placed in 10 litre plastic tubs during the assessment, it is likely that there will be further decay on a time-scale of several years. Most of the samples appeared to be in a sufficiently good condition to be of value for analysis in the short term, however.

1.3 *Coppergate-Piccadilly Development*

A watching brief was maintained during work on the land immediately to the south of the excavation at 16-22 Coppergate (Fig. 2). Some sampling was possible, but the scale of recording and sampling was necessarily limited by building work in progress. Dating of much of the material is uncertain for the same reasons. The information obtained during the watching brief is of value in establishing the relationships of the 16-22 Coppergate and 22 Piccadilly sites. Some work has been carried out on plant and animal remains from contexts associated with an Anglian helmet (Tweddle 1992; Hall 1985; Jones 1985a, b; Kenward 1985; O'Connor 1985) but material from other parts of this site remains uninvestigated.

1.4 *The 22 Piccadilly (ABC Cinema) site (assessment: Carrott* et al. *1995)*

Excavations at the ABC Cinema site at 22 Piccadilly, York, were undertaken by York Archaeological Trust in 1987. Four trenches were opened, which revealed a deep stratified sequence of deposits of Roman to medieval date, many layers being rich in organic remains preserved by anoxic waterlogging—typical for this area of York and not unexpected, given the proximity of the site to the present course of the River Foss and its probable former course. The elucidation of the history and precise course of the Foss was a major reason for carrying out this excavation, as was an exploration of the sequence of occupation in this part of York, lying, as it does, to the riverward end of the intensively investigated area at 16-22 Coppergate and close to the Anglo-Scandinavian site at 6-8 Pavement (Lloyds Bank). These latter two sites have been the subject of detailed bioarchaeological analysis (Hall *et al.* 1983; Kenward and Hall 1995).

Much of the archaeological sequence at 22 Piccadilly has been interpreted provisionally as the result of 'deposition at the water's edge either by natural agencies or perhaps as a result of deliberate dumping' (Finlayson 1988), with the effect of moving the

waterfront west from its supposed pre-occupation course. There were two main series of structural elements: occasional linear features which may have assisted drainage across the site, and 'many examples of timber and wattle features running both at right-angles and parallel to the river' (*ibid.*). These wooden structures were not associated with any deposits interpreted as floors or occupation build-up and may thus have been boundary markers and/or revetments on the river slope. Some of the structures 'may have actually revetted the river's edge itself, although they could not be described as having formed a sophisticated waterfront' (*ibid*.). The duration of 'dumping by the river' is dated (provisionally) to the Roman to early post-Conquest periods, with the main phase being in the 10th and 11th centuries (Periods 3 and 4-1). For the later medieval period, 'the only feature of any consequence ... was a fine example of a barrel-lined well containing two complete barrels' (*ibid.*), the topmost barrel and the remainder of the medieval deposits having been truncated when the cinema (which occupied the site from the early part of the 20th century) was constructed.

The deposits encountered at Piccadilly were subjected to extensive sampling, including a large-scale sieving programme for the recovery of bones, large plant remains and artefacts. Subsamples from most substantial contexts were taken for (a) site-riddling (SR *sensu* Dobney *et al.* 1992) to 11 mm (using a cement-mixer as an experimental means of disaggregating the material); (b) bulk-sieving (to 1 mm); and (c) as a GBA sample for the laboratory analysis of plant and invertebrate remains.

It is strongly recommended that the material from 22 Piccadilly is investigated in relation to that from the 16-22 Coppergate site, because the two sites are effectively contiguous (Fig. 2) and may represent related, perhaps complementary, activity areas.

1.5 *Other relevant sites*

1.5.1 **The 6-8 Pavement site**

The site at 6-8 Pavement was the subject of the earliest intensive investigation of large numbers of samples of early medieval occupation deposits for plant and invertebrate remains (Hall *et al.* 1983). Data concerning the biota of well over 50 samples, mostly from deposits of Anglo-Scandinavian date, are available in electronic form for comparison with those from 16-22 Coppergate.

1.5.2 **The 5-7 Coppergate site**

Analysis of 18 samples was carried out at the same time as the investigation of material from Pavement (*ibid.*); again, the data are stored electronically and are eminently suitable for comparison and synthesis. Dating of this material was broadly to the late Anglo-Scandinavian to Norman period and might usefully be refined by AMS dating of suitable remains from samples in store.

1.5.3 **The 44-5 Parliament Street site**

Deposits at this site were investigated initially as part of an archaeological evaluation (Carrott *et al*. 1995a) and latterly as the subject of a study of supposed recent in-ground decay of 'waterlogged' organic deposits (Carrott *et al.* 1996b). The levels investigated have been dated by their content of pottery to the 11th-13th centuries and the records concerning them are thus relevant to a study of change in time and space in the Coppergate-Pavement area.

1.5.4 **Merchant Adventurers' Hall**

Two evaluations have been carried out on archaeological deposits directly adjacent to the medieval foundations of the Merchant Adventurers' Hall in Piccadilly, and between the Hall and the River Foss. The second these evaluations produced richly organic deposits, apparently 14th century dumps, and in some

cases almost certainly primary. These deposits can be regarded as functionally equivalent to some of those at 22 Piccadilly, and selected samples from them should be analysed so that the data can be incorporated into the present study.

1.6 *Related research*

The large body of samples from Coppergate, in particular, is undoubtedly of great significance as a source of information about English medieval life and as comparanda for material from throughout north-west Europe. The pre-Conquest material has already proved to be a stimulus to various threads of research, leading to a series of publications on: the identification of vegetative plant remains, including dyeplants (Hall 1992a; 1992b; 1995; 1996; Hall *et al.* 1984; Tomlinson 1985a; 1985b; 1991); the identification of faecal deposits and the prevalence of intestinal parasites (Hall *et al*. 1983; Jones 1984; 1987); the utilisation of cess pits through time and their implications concerning population density (Kenward and Large in press); the interpretative significance of insect assemblages (Kenward and Allison 1994a) including their implications for site size, continuity of occupation and trading links (Kenward and Allison 1994b; Kenward in press); and wider issues of the interpretation of archaeological occupation deposits (Kenward and Hall in press; Hall and Kenward 1996).

Beyond studies of plant and invertebrate remains, for 16-22 Coppergate there are publications dealing with the bone (O'Connor 1989), pottery (Mainman 1990), ironwork (Ottaway 1993), and non-ferrous metalwork (Bayley 1992) from Anglo-Scandinavian levels, with textiles, cordage and raw fibre (Walton 1989) and with the post-Roman coins (Pirie 1986) from the site as a whole, and with the Anglian Helmet (Tweddle 1993). A series of publications dealing with the stratigraphic sequence and with various other categories of finds is planned (YAT 1996). Results of these and of elements of the work proposed here will be incorporated into a proposed major English Heritage-backed project ('Anglo-Scandinavian York: Synthesis').

2 **Summary statement of potential**

The corpus of material from these sites has potential in the following areas:

2.1 *Site interpretation*

(i) identification of the broad nature and mode of formation of deposits, and thus their archaeological significance

(ii) detailed identification of materials contributing to layers and their implications concerning activity and living conditions

(iii) determination of the condition and duration of exposure of pit fills and their implications for waste disposal regimes and consequences for health and hygiene

(iv) reconstruction of ecological conditions and human activities on yard surfaces

(v) determination of the nature and sources of a range of raw materials

(vi) the recognition of episodes of flooding from the adjacent River Foss

(vii) investigation of spatial differentiation of function and activity across the area represented by the sites.

2.2 *Analysis of spatial differentiation in Anglo-Scandinavian and post-Conquest York*

Determination of the degree of differentiation in function of the areas represented.

2.3 *Analysis of change through time*

(i) detection of patterns of change, including trends within the post-Conquest period and contrasts between the Anglo-Scandinavian deposits and the post-Conquest material.

2.4 *Wider significance*

(i) Obtaining an essential standard for comparison with other sites in York, both contemporaneous and of other periods

(ii) The data from the post-Conquest phases at these sites will (as have the data for Anglo-Scandinavian Coppergate) provide a major source for higher level synthesis and a stimulus to further research.

3 **Aims and objectives**

3.1 *Site interpretation*

Together, the extant samples from 16-22 Coppergate and 22 Piccadilly have enormous potential for interpretation at the context and feature level. The post-excavation project should aim to:

(i) identify the broad nature of layers (e.g. as containing human faeces, food preparation waste, stable manure, waste from craft processes, or having been deposited by random accumulation) and thus their implications concerning many aspects of human activity and living conditions

(ii) make more detailed identification of materials contributing to layers (e.g. the precise food resources utilised and the elucidation of sources of raw materials such as moss and hay)

(iii) determine the condition of pit fills and their implications for waste disposal regimes and consequences for health and hygiene on the basis of determination of the nature of their contents and likely duration of exposure

(iv) reconstruct ecological conditions and human activities on yard surfaces, particularly to determine what vegetation was established, whether there was cultivation, and whether livestock was kept

(v) determine the degree of spatial differentiation of function and activity across the sites. The four tenements in Coppergate (Fig. 7) are not evenly represented by the samples (the volume of sediment excavated differed considerably), either in absolute numbers or in the distribution of samples between deposit types (tables 1-5 in Carrott *et al.*) 1996a). There is, however, significant potential for (a) comparison between tenements, allowing some insights into differences in usage and perhaps even in attitudes to hygiene, providing care is taken to ensure adequate representation at the processing and recording stages; and (b) comparison of the front and rear parts of the Coppergate site, 6-8 Pavement, 22 Piccadilly, and Merchant Adventurer's Hall to determine whether complementary patterns of disposal can be identified

(vi) patterns of change will be sought and contrasted at Coppergate and Piccadilly, but information will also be drawn from the other sites mentioned above. Trends within the post-Conquest period and contrasts between the Anglo-Scandinavian deposits and the post-Conquest material will be examined.

The bulk of the samples from post-Conquest Coppergate are, on the basis of pottery spot dates, of 11th-15th century dates, with sufficiently large numbers of samples within each approximate century to permit analysis of time trends. It is reasonable to assume that dating will be substantially refined during the 'post-Conquest Coppergate sequences' project (although it is already at least adequate), taking account of stratigraphy, other artefacts, and likely residuality, and that those contexts which currently have no pottery date can be dated with respect to underlying and overlying layers.

Analysis of time trends will not be restricted to the post-Conquest material. Such analysis has only been carried out in a very simple way for the Anglo-Scandinavian samples, and it is essential that all the material from the site is considered. In particular, it is important to examine change (or the lack of it) across the period of the Norman Conquest, and the timing of the appearance of grain pests (probably reflecting major changes in storage and trading patterns of cereals) and exotic foods. The main limitation on a comprehensive analysis of long-term time trends is the rarity of post-Conquest floor and internal occupation deposits (only 11 have been identified amongst the samples, despite the evidence for the existence of a considerable

number of buildings, e.g. in Figs. 3-5), although this very rarity is obviously significant.

3.2 *Data for synthesis at city level*

Analysis of the biota from these sites will be designed to provide a broad view of site utilisation and environment through seven centuries. The data from Coppergate will thus provide an important standard for comparison with other sites in York, both contemporaneous and of other periods.

3.3 *Obtaining data for higher level synthesis*

The analysis of the large body of samples from Coppergate, in particular, will be designed to maximise the value of the results as a source of information about English medieval life and as comparanda for material from throughout north-west Europe.

4 **Publication and presentation**

Publication by York Archaeological Trust in the series *The Archaeology of York* is assumed but it may be desirable to produce journal articles dealing, for example, with some aspects of time trend analyses. Detailed data and workings will be presented in one or more Technical Reports in the series *Reports from the EAU, York*. Semi-popular articles will be prepared for YAT's *Interim*, and results will be presented at conferences and in public lectures.

4.1 ***Proposed structure and content of the* AY** *report*

The report will be in A4 format and it is estimated that it will be of the order of fifty thousand words, 20 pages of tables and 50 pages of figures/half-tones, totalling approximately 170 pages.

4.2 *Proposed structure and content of the Technical Reports*

Technical Reports will be structured by site, period, feature type, context group, context and sample. Sufficient descriptive material will be provided to illustrate the reasoning behind interpretation. Full species lists will be presented by subsample assemblage. Analyses and diagrams produced during working but not presented in the publication text will be included. The text and data components of the reports will be made available in electronic form, perhaps via the Internet.

5 **Methods statement**

5.1 Project initiation: The post-Conquest samples from 16-22 Coppergate are known to have decayed in some cases and all are threatened after as much as 20 years in store. It is thus essential that this most significant body of material is investigated soon, before further decay occurs to the stored samples. It is emphasised, however, that almost all of the samples assessed by Carrott *et al.* (1996a) were still in sufficiently good condition to be a valuable source of information. All the material will be processed as early as possible in the project in order to avoid further degradation of the evidence by decay, even though some of the biological analyses will have to be carried out at a later stage.

An important lesson learnt from work on Anglo-Scandinavian samples from Coppergate was that the usefulness of analyses is greatly reduced where only plant or invertebrate remains have been investigate. In the present project, any sample regarded as of high priority for analysis of either plant or invertebrate macrofossils or for microfossils will be recorded at least semi-quantitatively for all three categories of evidence in order to maintain comparability and ensure an adequate database for further analysis.

5.2 **GBA samples** from each of the sites will be selected for description, 'test' processing (Kenward *et al.* 1986), and detailed analysis on the basis of their potential to contribute to

project aims and objectives, as follows:

5.2.1 A list of samples required will be prepared and transport from store arranged with YAT (Tasks G1-2).

5.2.2 In order to understand better the nature and mode of formation of the deposits, routine descriptions of the sediments will be made before processing of those samples selected for extraction of macrofossils, and brief descriptions be made for those samples not selected. Two replicate subsamples from each of about 120 representative samples selected from those destined for processing will be submitted to loss-on-ignition analysis to determine their water and organic content (Tasks G3, S2).

5.2.3 A selection of about 70 samples will be submitted to detailed sediment descriptions (Task S1).

5.2.4 (a) Coherent lumps of sediment from selected samples from 22 Piccadilly and Merchant Adventurers' Hall will be used to provide (20) thin sections to investigate the mode of deposition, particularly whether voids in dump deposits have been infilled subsequently by sediment through flooding (Tasks S3-4).

(b) An assessment will be carried out to determine whether particle size analysis can be used to address the identification of deposits containing a substantial waterlain component. For assessment, 10 samples from the supposed riverside dumps at Piccadilly, 10 from presumed terrestrial deposits at Coppergate and 5 each from modern river flood deposits and alluvium of Anglo-Scandinavian or early medieval date from excavations at Foss Bank/Layerthorpe Bridge (under investigation at the time of this project design) (Task S5). (A necessary additional component of this assessment task will be a comparison of the use of peroxide digestion and ignition as methods for obtaining the mineral component of the samples free from organic matter.)

(c) If the results of the assessment show the technique to have sufficient potential, a large scale study will be undertaken using a total of 60 samples from Coppergate, Piccadilly and Parliament Street, 20 from Merchant Adventurers' Hall, 10 from deposits thought to have formed in the King's Fishpool (from sites in the Piccadilly/Hungate area) and a further 5 samples from known alluvial deposits in the lower Foss basin (Task S6).

5.2.5 The plant and animal macrofossil biota of sufficient of the samples to provide a useful reconstruction of post-Conquest activity and environment in the Coppergate-Piccadilly area, to allow meaningful analysis of time trends from the ninth to the fifteenth centuries, and to permit statistically significant comparison with the Anglo-Scandinavian material by tenement/use area and context type, will be recorded.

Apart from material which can reasonably be rejected on the grounds of uncertain dating or provenance, or a high probability of a large content of residual fossils, or where the remaining sediment has degraded in storage or is of insufficiently large quantity, all of the samples not processed during the 16-22 Coppergate assessment and a selection of those from the other sites will be processed using 1-3 kg test subsamples, following the initial inspection and routine sediment description. It is estimated that it will be necessary to process test subsamples from approximately 325 samples (Tasks G4).

5.2.6 Following this, material will be selected for recording on the basis of an initial inspection of the flots and residues (Task G5), so as to provide the most useful representation of the range of periods, tenements, feature types, and plant and insect assemblage types for data analysis above context level.

It is anticipated that a large proportion of the samples from Coppergate will need to be recorded to provide this level of representation, and that, at most, it will be advisable to reject some pit fills from some tenements as redundant (this assumes that the biota of the pits will prove not to be as variable as for the Anglo-Scandinavian material). An estimated 100 samples from sites

other than Coppergate will be recorded, giving a total of approximately 290 to be recorded for plant and invertebrate macrofossils (Task G6).

On the basis of the assessment and experience of the Anglo-Scandinavian material from Coppergate, about 10% of the plant and insect assemblages will be very small and will be recorded in a few minutes (these will be recorded since experience has shown systematic differences between deposits high and low concentrations of remains). The remaining samples will have a concentration of remains sufficiently high to provide useful assemblages from subsamples, 1-3 kg subsamples. The range of assemblage types appears, on the basis of assessment, to be fairly limited, and the taxa present to be (in the main) ones which are familiar from work on the Anglo-Scandinavian groups. Recording will thus not need to be protracted. An allowance of 2 hours per plant subsample assemblage is suggested to be a reasonable mean time for basic recording, with additional time for difficult identifications and data input. For the insect assemblages, an average of 2.5 hours, again, for basic recording, is suggested, with a further allowance for data input and for identification of selected material from 'difficult' groups, including lice and scale insects, where they have interpretative value.

Scanning electron and light photomicrographs of representative fossils will be made as a record and for report illustration.

5.2.7 All well-stratified samples (approximately 325) will be surveyed for microfossils using the 'squash' technique (Dainton 1992; Task G7). This will be directed towards producing a basic record of presence and taxonomic range data for diatoms, phytoliths, and the eggs of parasitic worms. For the last of these, it will be necessary to make multiple squashes of a selection of samples (perhaps 80) in order to make more precise estimates of concentrations and preservation and to provide sufficient measurements for specific identification of trichurids (Task G8). Following this, a selection of samples will be subjected to concentration techniques in order to search for a wider range of taxa, for example species associated with rodents, and the horse parasite *Oxyurus equi*. Permanent mounts abd a photographic record of selected microfossil subsamples will be made as vouchers for the archive.

5.2.8 In order to address specific problems which arise during the routine analysis, further, highly-targetted detailed investigations will be made of selected material.

(a) For plant and insect macrofossil assemblages the time allowance under this heading includes detailed identifications of the full range of taxa in significant assemblages, further identification of recurring critical species, and museum identification of rare species which may be of interpretative significance (Tasks GS1-2).
(b) An attempt will be made to identify the range of cladoceran resting eggs (ephippia) present in interpretatively significant samples; this will necessitate contact with colleagues in other institutions and the preparation of modern reference material (Task GS3).

5.2.9 Certain other groups of organisms which will be of importance in archaeological reconstruction will require external specialist input:

(a) Fly puparia are present in almost all of the samples and sufficiently abundant for analysis in a substantial proportion; they will be used to provide invaluable information about small-scale and ephemeral habitats such as carrion and faeces left on surfaces. The presence and broad nature of the assemblages of puparia will be noted during routine recording of insect remains, but selected assemblages of puparia (perhaps 30) will be submitted to full analysis, following a survey (Task GS4). It would be prohibitively expensive to undertake systematic identification of all of the immature fly remains, but care will be taken not to overlook any characteristic or unusual groups. This work will require some input from an external consultant; currently, Peter Skidmore, formerly of Doncaster Museum, is retained to provide expert advice concerning fly puparia.

(b) Mites are present in small to large numbers in a substantial proportion of the samples and a detailed record of a selection of the assemblages of mites (say 20) will be made (Task GS5) in order to broaden the range of evidence for ecological conditions in small areas. This will require an external consultant, Dr Jaap Schelvis, University of Groningen, Netherlands, who is the leading specialist in this field and who has previously collaborated successfully with the EAU.

(c) Further squashes will be used to improve the record of the distribution and abundance of the main types of phytoliths within particular samples, especially in order to improve the detection of very humified stable manure or turf, and perhaps in order to cast additional light on vegetation developed on the site (Task GS6).

(d) A small number of detailed analyses of diatoms will be necessary in order to determine depositional conditions (aquatic or terrestrial) of a few sediments containing abundant valves (Task GS7). A small number of analyses will also be made in order to attempt to determine whether there is evidence for the importation of river water for use on the site, or for flooding; these results will be correlated with those from analyses of plant and invertebrate macrofossils which may have a similar origin.

(e) A small number of samples will be analysed for the remains of ostracods in order to address broadly the same problems as for the diatoms (Task GS8).

These contracts external to the EAU will require resources for administration, inlcuding preparation of material for despatch to specialists (Task GS9).

5.2.10 It will be necessary to process and analyse further GBA subsamples (from samples already examined or those not initially selected) in order to address specific interpretative problems (Tasks F1-4).

5.2.11 Some additional *pre-Conquest* material will be recorded (Tasks AS1-5). A number of GBA samples which were assigned to Period 6 at the time the text for the report on Anglo-Scandinavian material was being prepared have now been reassigned to Period 5 (late 10th-later 11th century). Some of these are of considerable importance because they evidently fall on the Period 5/6 boundary and thus may be particularly useful in terms of tracing change (or the lack of it) at the time of the Norman Conquest, and others may be valuable as representatives of rather rare context types. As selection of these re-phased sampled will be recorded. As stated in the report on the Anglo-Scandinavian material (Kenward and Hall 1995), certain phase/feature type combinations are under-represented in the material recorded, where suitable samples are available. It is estimated that there are about 10 samples from re-phased deposits which will be processed, and about 10 samples needed to fill in ‘gaps’ in the Anglo-Scandinavian database.

It will also be necessary to re-examine some Anglo-Scandinavian material where it is suspected that certain classes of remains were poorly recorded early in the project—some vegetative remains fall in this category, for example, and phytoliths and diatoms were not included amongst the groups whose presence was sought. For re-examination of samples already processed, there will be a time allowance for re-processing where the flots or residues have degraded or been lost, as well as for inspection (Task R1).

5.3 A list of **BS material** (almost all processed at an earlier stage) will be prepared and delivery arranged (Task B1). An estimated 225 BS samples (washovers and residues) will be examined. BS samples from 22 Piccadilly were all processed at the time of excavation but many require rinsing and drying before they can be examined (Task B2). All residues relevant to this project will be recorded at the level considered appropriate, following a rapid examination (Task B3). All the post-Conquest BS samples from 16-22 Coppergate were examined incidentally during the main phase of work on Anglo-Scandinavian samples, though for a proportion of them (probably about one third) only those remains removed

during general 'sorting' were recorded. Certain of the plant macrofossil identifications will be checked, and the samples for which it is suspected that certain components may have been poorly recorded will be briefly re-examined.

Some residues from 'excess' GBA samples submitted to bulk-sieving (Task AR3) to reduce the quantity in store will also be quickly checked for their content of plant macrofossils and other materials (Task B4).

5.4 There is a record of the general nature, and sometimes more specific identification, of many of the **spot samples**, but all of the extant spot samples from these sites will be examined briefly before carrying out further work on a limited, carefully targeted, selection (Task SP1). Many of the spot samples, including those numerous ones labelled 'eggshell', are unlikely to be of much value and can probably be disregarded. It is estimated that approximately 30 spot samples will require further analysis for plant remains but that only about 10 will be of value for insect analysis. It is believed that a small number of the spot samples are large enough to provide sediment for 'GBA' analysis and these may allow analysis of plant and invertebrate macrofossils for contexts where there is no extant GBA sample. These have been allowed for in the estimates for work on GBAs.

5.5 **Molluscs** are so rare in the GBA samples as to require no systematic investigation. The exisiting archive will be consolidated and rationalised. Any assemblages of land or freshwater snails which appear likely to be of interpretative significance will be recorded; this work requires no more than a very modest time allowance. Similarly, should concentrations of small (and presumably non-food) **marine shells** be found, they will be investigated in order to determine their means of importation, but the large shells will warrant no further work unless of species not otherwise recorded (Task M1).

5.6 It is assumed that a computer record for the data for **bone** from Anglo-Scandinavian 16-22 Coppergate will have been created as part of the Anglo-Scandinavian York Synthesis project, and that bone from post-Conquest levels will have been computer-recorded as part of the post-Conquest bone project. If this is not the case, then additional time will be required for the present project.

Selected groups of bone from 22 Piccadilly and the Merchant Adventurers' Hall will be recorded using the protocols given in the post-excavation project design for analyses of material from the Saxon site at Flixborough, S. Humberside (N. Lincolnshire) in order, when combined with the data from 16-22 Coppergate, to provide data for spatial and temporal analysis in the Coppergate-Piccadilly area (Tasks BO1-2).

A small amount of bone will be recovered through processing of GBA, BS and Spot samples. It will be reviewed and where appropriate analysed and reported (Task BO3).

5.7 Identifications of **wood and timber** (including wooden artefacts) collected during excavation, have already been made. Identifications will be made of wood samples or objects which have been overlooked, recovered during processing of GBA or BS samples or for which the original identification was tentative or requires reconsideration (estimated 100 specimens; Task W1).

5.8 **Illustrative material**, including drawings, graphs and photographs will be produced by project staff, the Department of Biology, University of York (Task IL1), and by the Graphics and Editorial team producing the publication report (estimates not included).

5.9 **Analysis of data** will include (a) full treatment of individual 'material' data-sets and integration of all the material data-sets, as well as analysis in relation to the archaeological record; and (b) analysis of changes and trends throughout the Anglo-Scandinavian and post-Conquest periods. A detailed *Technical Report* will be prepared in order to facilitate synthesis for the publication report and to place full data on record and reveal the interpretative reasoning applied. All of the lines of sedimentological and biological evidence will

be integrated as fully as possible, and be set in the framework of an outline of the archaeological results (Tasks D1-3).

The Technical Report will be made available on request through the EAU *Reports* series (Task D4) and also in electronic form (perhaps via the Internet). Well-structured paper archives and accessible databases of all raw data will be prepared. Where practicable, the Anglo-Scandinavian and post-Conquest databases will be amalgamated.

It is assumed that estimates for preparation, revision and proof-reading of any ensuing **publication report** (Tasks D5-7) will be required at a later date.

5.10 The written and electronic **archives** will be prepared for museum accession (Task AR1).

Voucher samples will be prepared for the GBAs. Excess material from the GBAs will be bulk-sieved and sorted for significant components, inlcuding artefacts (the latter to be returned to YAT). Vouchers will be packaged in polythene bags within tubs so as minimise degradation; the quantity retained will vary according to the nature and content of the material (Task AR2-3).

The remainder of the material archive will be catalogued, checked for condition, and prepared for museum storage (Task AR4). It is assumed that an allowance will be made for the cost of museum accession when the whole of each of the associated archaeological projects has been completed.

5.11 Internal **project monitoring meetings** will be held regularly throughout the project. Databases will be kept up to date. (Task A1). Meetings will be held with the CAS monitor (Task A2). Technical support will be required for general laboratory tasks, sample storage and movement (Task A3).

5.12 In the initial and final stages of the project York Archaeological Trust staff will provide archaeological information at a level of detail beyond the 'Level III' report, where appropriate, and refinements of dating and phasing (Task A4).

6 **Health and safety**

The work proposed here to be undertaken at the EAU will conform to the University of York's comprehensive guidelines on employment practice and health and safety standards.

7 **Resources and programming**

7.1 *Staffing and equipment*

Tables 1-4 present a summary of the work recommended and its resource implications.

7.2 *Consumables*

(i) The methodology described above has implications for physical resources. Table 2 gives outlines the necessary consumables and other non-staff elements. The figures include an allowance for replacement of computers, assuming a 4-year life and on the basis that approximately 3.5 person-years of work are anticipated.

(ii) The volume of data from the sites considered here, together with those from Anglo-Scandinavian 16-22 Coppergate, will be too great for the computer currently in use for insect data analysis to handle reliably. It will therefore be necessary to replace it by a modern machine of high specification (2 GB hard drive, 32 MB RAM, 200 MHZ Pentium processor and CD drive). The printer connected to the existing machine is reaching the end of its useful life and also will require replacement for this project.

7.3 *Timetable*

In order to stay the decay of samples in store, it is proposed that practical work should commence as soon as possible, although the main involvement of the EAU Fellows will be

in 1999-2000.

It is assumed that estimates for preparation, revision and proof-reading of the publication reports will be required at a later date.

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