Characterisation Studies of Local and Non-Local English Wares from Tewkesbury Abbey, Gloucestershire

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The 1992 excavations at Tewkesbury Abbey produced a large collection of medieval pottery, much of which dates to the mid 13th century, with smaller quantities dating to the later medieval period.

Within this collection, a small number of vessels of non-local origin were identified. In some cases, visual examination of the fabric at x20 magnification or the nature of the vessel form or decoration were sufficient to identify the source but a small quantity presented problems of identification which could only be solved by further analysis of the fabric.

Consequently, four groups of sherds were selected for further study. They consist of

(a) Sherds whose fabric contains rounded quartz sand, similar to that in Worcester sandy wares (Hereford Fabrics C1 and C2, Vince 1985 and Vince 2002) but with rounded calcareous inclusions. The calcareous inclusions might be of Jurassic origin, in which case they could have been produced in the Tewkesbury area. If so, then the clay from which they were made might be derived from the Lower Lias as opposed to the Triassic-derived clays available in the Worcester area.

(b) Sherds of whiteware which might be of Bristol or midlands source (Hereford Fabric E2b or G7, V3963).

© Sherds of south central or southeast midlands origin (V3957, V3958, V3959, V3960, V3961). These have a low iron content, giving them a light brown colour (similar to that of some Laverstock and Brill/Boarstall products. However, the quartz sand temper is slightly coarser in texture than those two wares.

(d) A sherd with a fine white fabric (V3964). At x20 magnification two possible sources were suggested, a fineware from Surrey (Cheam or Tudor Green ware, Pearce and Vince 1988) or Developed Stamford ware. Chemical analysis suggests that this was a Developed Stamford ware vessel.

(e) In addition, one sherd from a tripod pitcher was identified as being a Malvern Chase product in thin section (V3962, Hereford B1) and one sherd from an unglazed jug was identified as 16th-century Sandy Minety ware (V3971).

Table 1

TSNO	Context	cname	Form	Action	Description
V3957	2122	MISC SKW	JUG	TS;ICPS	WT;EXT PLAIN GL
V3958	2153	MISC SKW	JUG	TS;ICPS	WT;EXT PLAIN GL
V3959	2235	MISC SGW	JUG	TS;ICPS	WT;EXT CUGL
V3960	2092	MISC SKW	JUG	TS;ICPS	WT;EXT PLAIN GL
V3961	2146	MISC SKW	JAR	TS;ICPS	WT;EXT PLAIN GL
V3962	2276	HERB2	TP	TS;ICPS	NO GLAZE; VERT APPPLIED STRIP
V3963	3029	MWW	JAR	ICPS	
V3965	3162	HERE2B	JUG	ICPS	FINE SUBANGULAR RED-COATED QUARTZ SAND C.0.2MM
V3964	3162	DEVS	JUG	ICPS	
V3967	2237	HERE2B	JUG	TS;ICPS	INT GLAZE
V3968	1000	MISC SGW	JUG	TS;ICPS	NARROW NECK;EXT PLAIN/LIGHT GREEN CUGL;BOTTLE?
V3970	2075	MISC SW	JUG	TS;ICPS;DR	UNGLAZED
V3971	2075	MISC SW	JUG	TS;ICPS	UNGLAZED
V3972	3233	MISC SKW	JAR	TS;ICPS	EVERTED RIM JAR;WT

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Local or Worcester sandy wares (V3970)

One sample was selected for analysis because of unusual features. It is an unglazed jug rim which might have been a Worcester jug (Hereford C2) subjected to burning after firing.

In thin section the following inclusion types were noted:

- Rounded quartz. Sparse well-rounded grains up to 0.7mm across.
- Subangular quartz. Moderate grains up to 0.5mm across.
- Chert. Moderate rounded grains up to 0.5mm across.
- Siltstone. Sparse angular fragments up to 1.0mm across.

The groundmass is black except at the surfaces, which are optically isotropic and dark brown. It contains sparse angular quartz up to 0.1mm across.

The inclusions are typical of sands derived from Triassic deposits and at Tewkesbury this probably implies a source in the Severn Valley. The frequency of chert is notable. Chert, in this case, could be either of sedimentary origin (e.g. Carboniferous chert) or altered volcanic glass, which might be expected in sands draining Silurian strata.

The chemical data were compared with samples of suggested local origin (the Fabric 1, 2 and 4 ceramic building materials) and material of Malvernian and south Worcestershire origin (Droitwich-type floor tiles, Tewkesbury CBM fabrics 3, 14 and 15). Unfortunately, this analysis found no chemical difference between these wares (excluding calcium and strontium, which had to be omitted from analysis because of the effect of burial). This suggests that the parent clay and sand temper in each case were broadly similar. The only group to stand out from this analysis consisted of samples made from marly Triassic mudstones (Fig 1, WORCS MARL = Tewkesbury CBM 3 and 14).

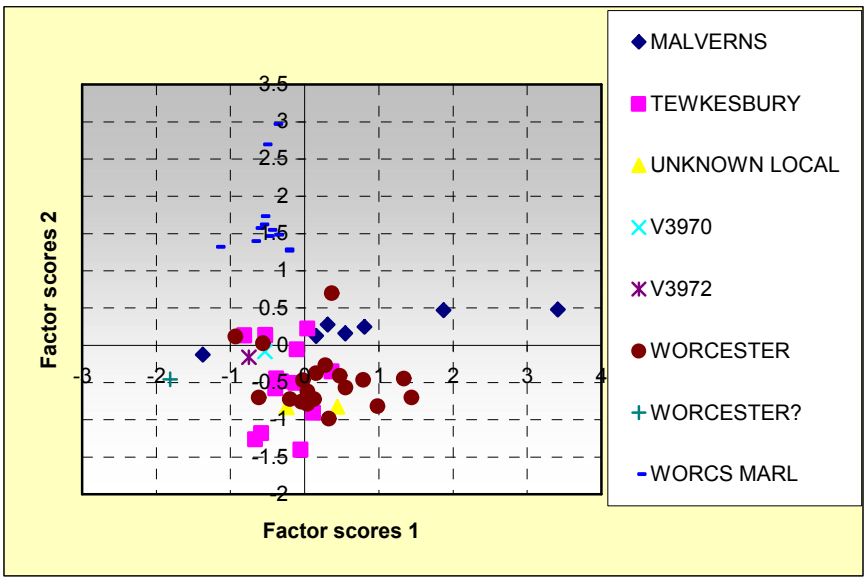

Figure 1

Malvern Chase Glazed Ware? (V3972)

A sample selected as a wheelthrown sandy ware of unknown origin was identified in thin section as a Malvern Chase glazed ware flanged bowl (Hereford B4).

In thin section, the majority of the inclusions were subangular and rounded quartz grains, as in Worcester sandy wares, but a single large angular fragment of strained quartz is likely to be from a gneiss.

Chemical analysis indicates a similar composition to the range of sandy wares analysed above (Fig 1).

Sandy Minety ware (V3931)

A sherd was selected for sampling because of it contained sparse rounded calcareous inclusions and fine quartz sand. Initially this was thought to be a possible local product but in thin section it was identified as a Sandy Minety ware. This ware was produced in the 16th century around the time when the pottery industry moved from Minety to the neighbouring village of Ashton Keynes.

In thin section the following inclusions were noted:

- Rounded quartz. Sparse grains up to 0.5mm across.
- Subangular quartz. Abundant grains mostly up to 0.2mm across with sparse grains up to 0.5mm across.
- Oolitic limestone. Sparse rounded fragments up to 1.0mm across consisting of non-ferroan calcite ooliths, replaced by micrite, in a sparry ferroan calcite groundmass. Also, one fragment of non-ferroan calcite echinoid shell? Also in a sparry ferroan calcite matrix.

The groundmass consists of light brown optically anisotropic baked clay minerals with few inclusions.

The chemical data was compared with samples of Minety ware and a single sample of Sandy Minety ware from Dursley. Factor analysis of this data indicates that the Tewkesbury Sandy Minety sample has a similar composition to that of Minety wares. The two Sandy Minety samples therefore have compositions at either end of that of Minety wares.

By contrast, the unknown whiteware and redware samples from Tewkesbury, included to see whether they had similar compositions to the Minety wares, have different compositions.

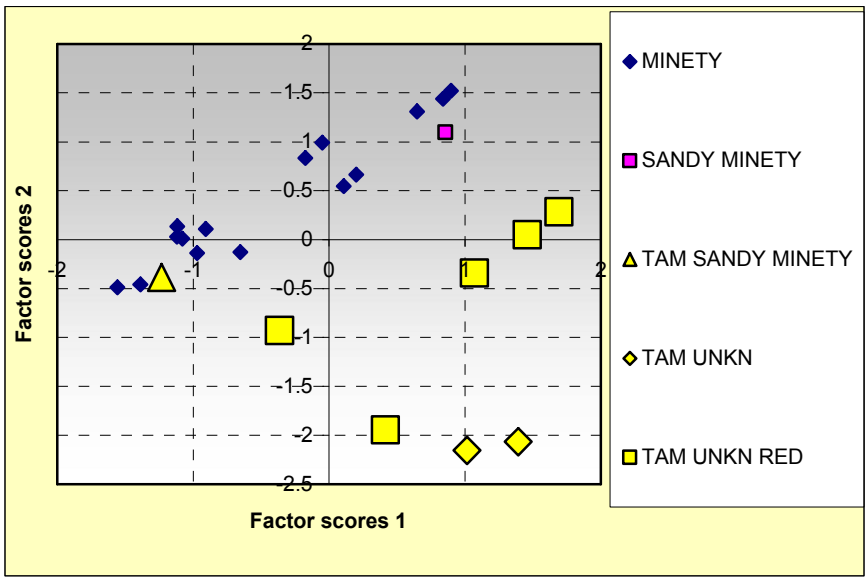

Figure 2

English whitewares

Four samples of vessels made from a light firing clay were analysed. They include a sherd from an internally-glazed conical jug. This is a common late medieval Bristol type but the vessel was higher fired than usual (V3967). Two sherd came from vessels with a well-sorted subangular quartz sand, whose grains on average were less than 0.3mm across and had a dull brown coating (V3968 and V3965). The groundmass in both cases was light brown and finely micaceous. One of these samples came from a narrow-necked vessel with a mottled green glaze whilst the other came from a larger jug, also with an external mottled green glaze. Fabrics similar to these, at x20 magnification, are known from Bristol.

The final sample consists of a sherd from a jug with no glaze on the surviving sherd. At x20 magnification the fabric is seen to be tempered with a well-sorted rounded quartz sand in which most of the grains have the well-rounded, matt surface typical of Permo-Triassic sands. Such sands occur in the Severn valley, perhaps occurring as far south as the Bristol Avon area. However, no examples with this fabric are known to the author from the city of Bristol whereas this is a common fabric in medieval Staffordshire, for example at Sneyd Green and the partially glazed vessels from south Staffordshire, two of which, from Stafford, have been sampled by the author.

By eye, therefore, these samples consist of one with a probable Bristol source (V3967), one with a probable Staffordshire source (V3963) and two of unknown origin. Thin-section and chemical analysis confirms a Bristol source for the first sample, supports a Staffordshire source for the second and is indeterminate for the two remaining samples, although confirming that they are both from the same source.

Bristol Medieval ware (V3967)

The following inclusion types were noted:

- Subangular and rounded quartz. Abundant grains up to 0.3mm across. Most are unstrained and monocrystalline.
- Rounded opaque/dark brown grains. Sparse well-rounded grains up to 0.3mm across.
- Calcareous inclusions. Sparse rounded voids with partial filling of altered limestone, up to 0.3mm across.
- Sandstone. Sparse subangular grains of fine-grained sandstone, some with a red cement, up to 0.3mm across.
- Mudstone/clay relicts. Rounded pellets of light-coloured clay, either inclusionless or with sparse angular quartz inclusions up to 0.1mm across.

The groundmass consists of light brown optically isotropic baked clay minerals and sparse angular quartz up to 0.1mm across.

The light colour of the groundmass, and the low quantity of quartz silt inclusions, suggests that this sample was made from a Coal Measures whiteware clay, probably a seatearth underlying a coal bed. The well-sorted, mixed sand is similar to that found in Ham Green ware, where the calcareous inclusions are probably Lower Carboniferous limestone. The degree of sorting and rounding of the inclusions is also similar to that of Ham Green ware, where it may be that the sand is beach-sorted. It is likely that some of the rounded clay pellets are detrital Coal Measures mudstone whereas others (with the silt inclusions) may be relict clay. There is no archaeological evidence that the Ham Green industry survived into the late 13th century, let alone into the 14th or 15th century, the likely date of this sample,, whereas there is plentiful evidence from both documentary sources and archaeology for the existence of a pottery industry in the suburbs of Bristol from the 13th to the 15th or early 16th centuries. One possibility is that clay and sand was quarried at Ham Green and carried by boat to Bristol.

The chemical composition data from this sample (Fig 1 TAM MWW) were compared with that from the two samples of Bristol medieval ware from Dursley (Fig 00 BR); samples of Coal Measures white-firing clay from the Clee Hills in south Shropshire (CLEE HILLS); clay and clay tobacco pipes from the Broseley area (BROSELEY); samples from the Sneyd Green kiln (MWWNS); samples of red-painted jugs from Stafford (MWWSS); the unknown redware from Tewkesbury (SEM) and the unknown whiteware from Tewkesbury (TAM UNKN). A plot of the first and second factors (Fig 1) indicated that the Tewkesbury Bristol ware sample is very similar to the two Dursley samples, distinguished by high F2 scores from the other samples.

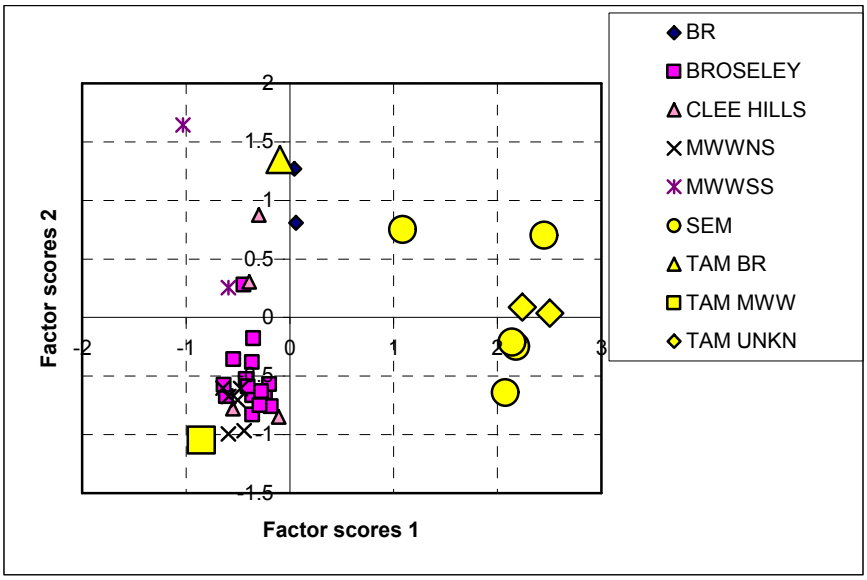

Figure 3

Midlands Whiteware (V3963)

No thin section was obtained from the putative Midlands Whiteware sample, since the sherd was too small to sample for both analyses. The chemical data was included in the factor analysis described above (Fig 1). In Fig 1 the sample is seen to have negative F1 and F2 scores, similar to the Sneyd Green wasters and to samples of white-firing clay from south Shropshire. However, both of the Stafford samples have positive F2 scores. This suggests that the Tewkesbury sample may be from the Stoke on Trent area.

Unknown Whiteware (V3965 and V3968)

Only one of these two samples was large enough for thin section analysis (V3968). In thin section the following inclusion types were noted:

- Rounded quartz. Rare well-rounded grains up to 0.3mm across.
- Subangular quartz. Sparse grains up to 0.3mm across. The grains often have a brown coating.
- Chert. Rare grains up to 0.3mm across with a brown coating.
- Siltstone. Two fragments of siltstone, both angular and elongate. One is c.1.5mm long and 0.4mm wide and is composed of abundant quartz silt and sparse rounded brown inclusions up to 0.1mm across. The other, 2.0mm by 0.4mm, has a mixture of dark brown silty areas, also with abundant quartz silt up to 0.1mm across, and layers of light-firing mudstone, lighter in colour and finer in texture than the clay groundmass.

The groundmass consists of optically anisotropic baked clay minerals and sparse angular quartz grains and muscovite laths up to 0.1mm across. One lens of slightly lighter-coloured clay was present.

The lack of brown coating on the rounded grains may indicate that they have a different source from the remainder, which appear to have come from an iron/clay cemented sand or sandstone. The siltstone fragments may be relicts from the parent clay, in which case it probably consisted of layers of different iron content and texture.

The samples were included in the same factor analysis as the other whitewares and unknown redware and were seen to have a similar composition to the unknown redware and to be different from any of the Coal Measures whitewares, from the Bristol area, south Shropshire or Staffordshire.

Unknown Glazed ware (V3957-61)

Samples of five different vessels with similar fabric characteristics were analysed. All come from wheelthrown vessels, some with a plain external glaze and others with a copper mottled external glaze. In thin section and chemical analysis similarities between this group and the unknown whiteware (V3965 and V3968) were noted and it is possible that the two wares differ mainly in firing (these five have light grey cores and light brown margins and surfaces as opposed to the oxidized firing of the unknown whiteware) and texture.

The following inclusion types were noted:

- Rounded quartz. Sparse grains up to 0.5mm across. Some of these grains have outlines which suggest a lower Cretaceous origin.
- Subangular quartz. Abundant grains up to 0.4mm across.
- Chert. Sparse rounded grains up to 0.3mm.
- Flint. Sparse subangular fragments up to 0.5mm, some stained light brown but mostly unstained.

The groundmass is light brown, optically anisotropic with few visible inclusions.

The flint and possible lower Cretaceous quartz suggest a source to the south or east of Tewkesbury. The light firing, inclusionless clay could be of middle Jurassic, lower Cretaceous or Tertiary origin.

The chemical compositional data were compared with a range of possible comparanda including: Coal Measures whiteware clays from the Bristol, Shropshire and Staffordshire areas; Middle Jurassic clays from the Stamford area; Tertiary clays from the Thames Basin (Kingston-type ware, Coarse Border ware, Tudor Green ware and Border ware), the Hampshire basin (South Hampshire redwares and whitewares, Laverstock ware and South East Wiltshire tripod pitchers). In all these comparisons, the Tewkesbury samples are more similar to each other than to any comparative material.

An examination of the chemical data indicates that the distinguishing feature of these groups is their high rare earth element values. All of the measured rare earth elements have high values apart from Ytterbium.

Malvern Chase Tripod Pitcher (HERB2)

The thin section of this vessel showed that it contained moderate angular fragments of acid igneous rock up to 1.5mm across, identical to those found in other Malvern Chase wares.

Few Malvern Chase products have been analysed chemically and so this sample is useful. Data from the Droitwich-type tiles from Tewkesbury (DROIT); three Great Malvern floor tiles from Croft Castle, Herefordshire (GM), a Malvern Chase flat roof tile of 16th-century date from Croft Castle (HERB5) and two samples of floor tiles from the Lady Chapel at Gloucester Cathedral (MALV) were compared with the HERB2 sample using factor analysis. A plot of the first against the second factors shows that the Droitwich-type tiles tend to have lower F1 and F2 scores than the Malvern Chase vessels. The factor analysis weightings for F1 and F2 show that both factors are the result of differences in several elements, indicating a fundamental difference in the Worcester-area Droitwich-type floor tiles and the Malvernian samples. There are too few Malvernian samples present for internal patterning to be identified in this plot. However, a plot of F3 against F4 (Fig 2) shows that the Lady Chapel tiles can be distinguished from the remainder of the analysed samples by their F3 scores whilst the tripod pitcher can be distinguished by its high F4 score..

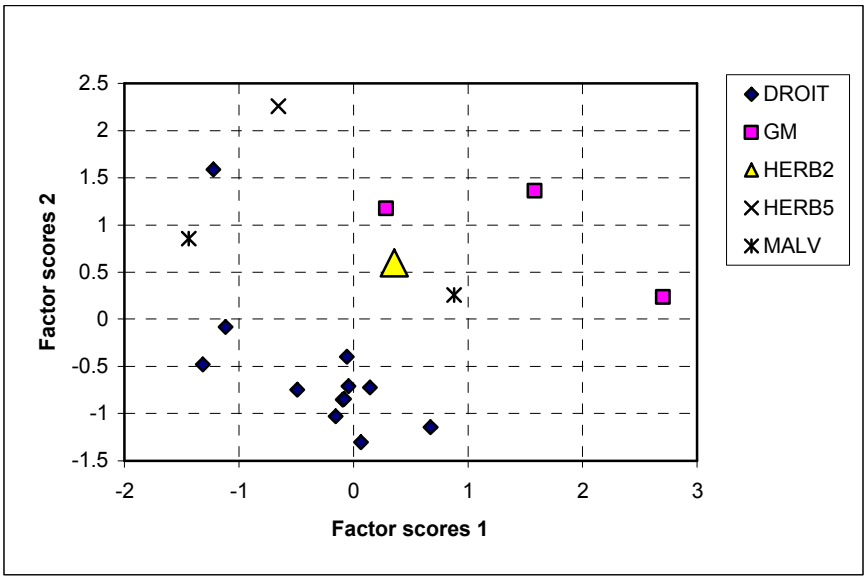

Figure 4

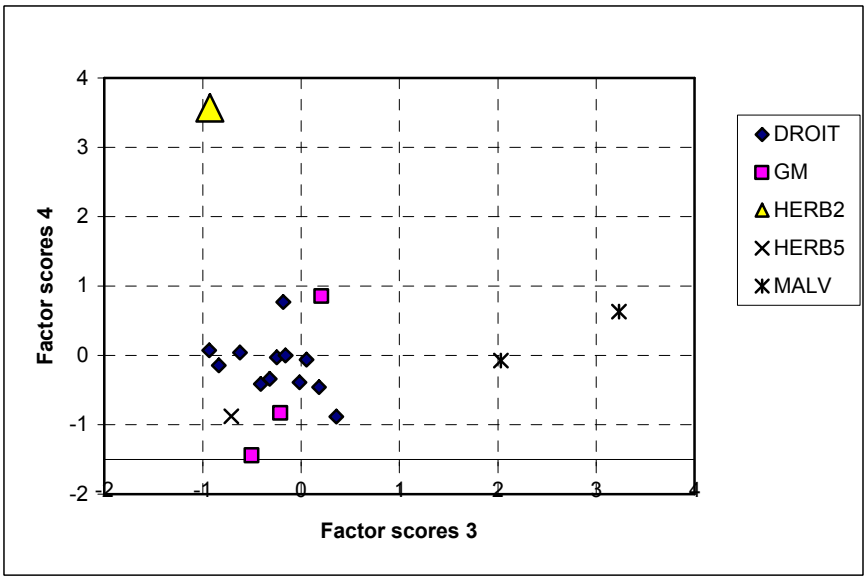

Figure 5

However, examination of the element weightings calculated by the factor analysis program indicates that the main contributor to F4 is phosphorus, which may be present as post-burial calcium phosphate deposited in the pores of the sherd. The main contributors to the F3 scores are nickel, cobalt, iron and vanadium, all of which are probably associated with iron-rich compounds, either detrital pellets or finely-divided and bonded to the clay minerals in the groundmass.

Developed Stamford Ware

The sample was compared with data from the 16th and 17th-century production site at Farnborough Hill (BORD, CBW, TUDG) and samples of Stamford ware from the Stamford Castle kiln (late 9th century, Kilmurry 1977); a consumer site in Durham (Late 11th century); the Pantiles kiln in Stamford (late 11th to mid 12th century); a consumer site on the A1 north of Wetherby (late 11th to mid 12th century); a kiln site at Wharf Road Stamford (11th century) and two sherds of Developed Stamford ware from Viborg, Jutland (Alan Vince 1998).

Factor analysis of this dataset reveals three clusters: early Stamford wares (Wharf Road and the Castle kiln); later Stamford and Developed Stamford wares (all the remaining Stamford ware samples) and the Farnborough Hill samples. The Tewkesbury sample has similar F1 and F2 scores to the Pantiles kiln and the two Viborg finds and since it has a copper-mottled green glaze is probably Developed Stamford ware, of late 12th to early 13th-century date.

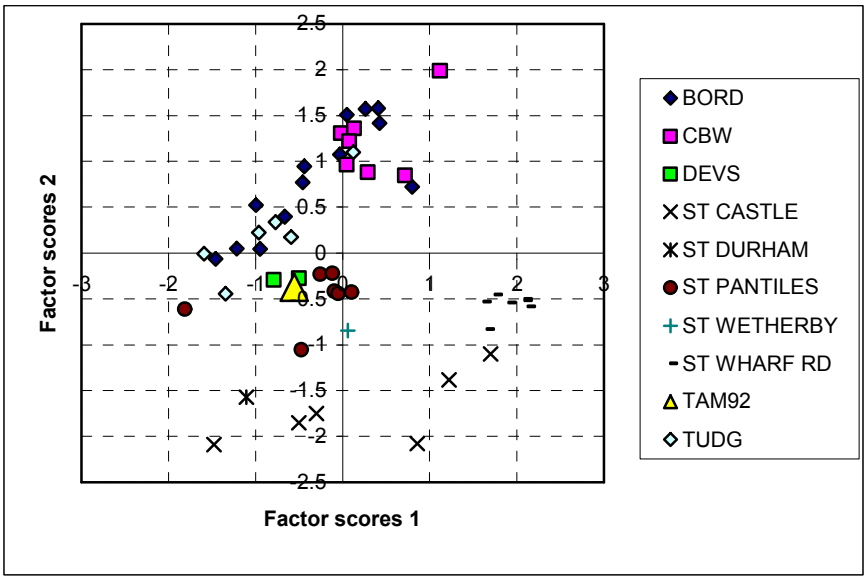

Figure 6

Conclusions

Samples of a variety of medieval wares of local or non-local English origin were analysed. In several cases these could be identified either through their petrology as seen in thin section or as a result of comparison with reference material. In most of these cases their identity was either unknown or questioned before analysis. These wares include Bristol medieval ware, Midlands whiteware from Staffordshire and Developed Stamford ware. Other samples were recognised after analysis as examples of wares which were already known from the Abbey Meadow site though visual identification and indicate that a proportion of the unidentified wares from a site are likely to be atypical examples of common types.

In addition, however, a group of seven sherds, from two distinct fabrics, could not be provenanced. This probably reflects a lacuna within the comparative material, which does not, for example, include glazed wares from the Oxfordshire/Buckinghamshire border region. It is likely that five of these unknowns are contemporary with the main period of deposition on the Abbey Meadow site, in the mid/late 13th century whilst two, visually, appear to be of later medieval date. They therefore represent a trading connection which may have been in existence throughout the medieval period.

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Appendix 1

TSNO	Al2O3	Fe2O3	MgO	CaO	Na2O	K2O	TiO2	P2O5	MnO
V3957	17.35	3.43	0.97	0.6	0.14	2.45	0.55	0.18	0.024
V3958	16.92	3.05	0.89	0.59	0.14	2.4	0.53	0.15	0.017
V3959	17.63	3.2	0.87	0.71	0.14	2.29	0.56	0.47	0.019
V3960	17.9	3.39	0.96	0.52	0.16	2.44	0.56	0.15	0.019
V3961	17.25	3.21	0.75	1.13	0.14	2.31	0.6	0.64	0.022
V3962	13.85	4.91	3.38	1.24	0.49	3.16	0.62	0.51	0.043
V3963	23.59	2.74	0.71	0.32	0.13	1.25	0.98	0.08	0.024
V3964	17.64	2.15	0.44	0.59	0.16	0.81	1.59	0.1	0.009
V3965	16.77	2.7	0.69	0.54	0.17	2.04	1.08	0.16	0.029
V3967	22.47	3.46	1.01	1.41	0.32	3.05	0.78	0.19	0.024
V3968	14.82	2.38	0.6	0.56	0.14	1.92	0.93	0.23	0.024
V3970	15.32	5.76	2.67	0.58	0.45	3.74	0.63	0.17	0.044
V3971	15	3.14	0.8	1.12	0.29	2.24	0.65	0.51	0.018
V3972	14.87	6.01	2.28	0.75	0.49	3.45	0.62	0.51	0.055

Appendix 2

TSNO	Ba	Cr	Cu	Li	Ni	Sc	Sr	V	Y	Zr*	La	Ce	Nd	Sm	Eu	Dy	Yb	Pb	Zn	Co
V3957	336	98	37	54	92	15	79	108	58	81	69	137	100	20	4	9	4	10,442	213	21
V3958	323	95	34	50	88	14	78	102	56	73	69	132	101	21	4	9	4	1,107	199	19
V3959	450	98	33	46	61	14	117	106	48	81	57	104	72	15	3	7	3	589	130	14
V3960	275	67	22	52	76	15	82	111	58	86	68	148	101	21	4	9	4	170	180	25
V3961	487	76	29	31	72	15	125	109	56	98	80	184	135	28	5	10	4	300	135	19
V3962	803	85	28	65	30	14	180	78	22	74	35	59	14	8	1	4	2	617	110	17
V3963	291	52	39	68	16	27	44	134	14	111	16	33	(3)	0	1	2	2	280	42	14
V3964	233	122	42	216	27	16	71	115	18	97	58	107	53	10	2	3	2	432	36	18
V3965	366	102	60	82	54	17	85	122	56	117	96	175	117	21	4	9	4	4,320	123	25
V3967	554	84	82	176	59	23	194	152	29	96	53	101	42	11	2	5	3	845	69	26
V3968	349	69	25	79	55	15	82	100	54	109	86	158	101	20	4	9	4	497	147	20
V3970	581	87	22	81	31	13	81	84	15	53	35	65	11	6	1	3	2	211	92	16
V3971	458	121	30	47	32	16	95	103	19	77	38	69	23	5	1	2	2	320	89	14
V3972	659	85	18	79	32	13	95	82	16	69	34	66	5	6	1	4	2	135	85	18