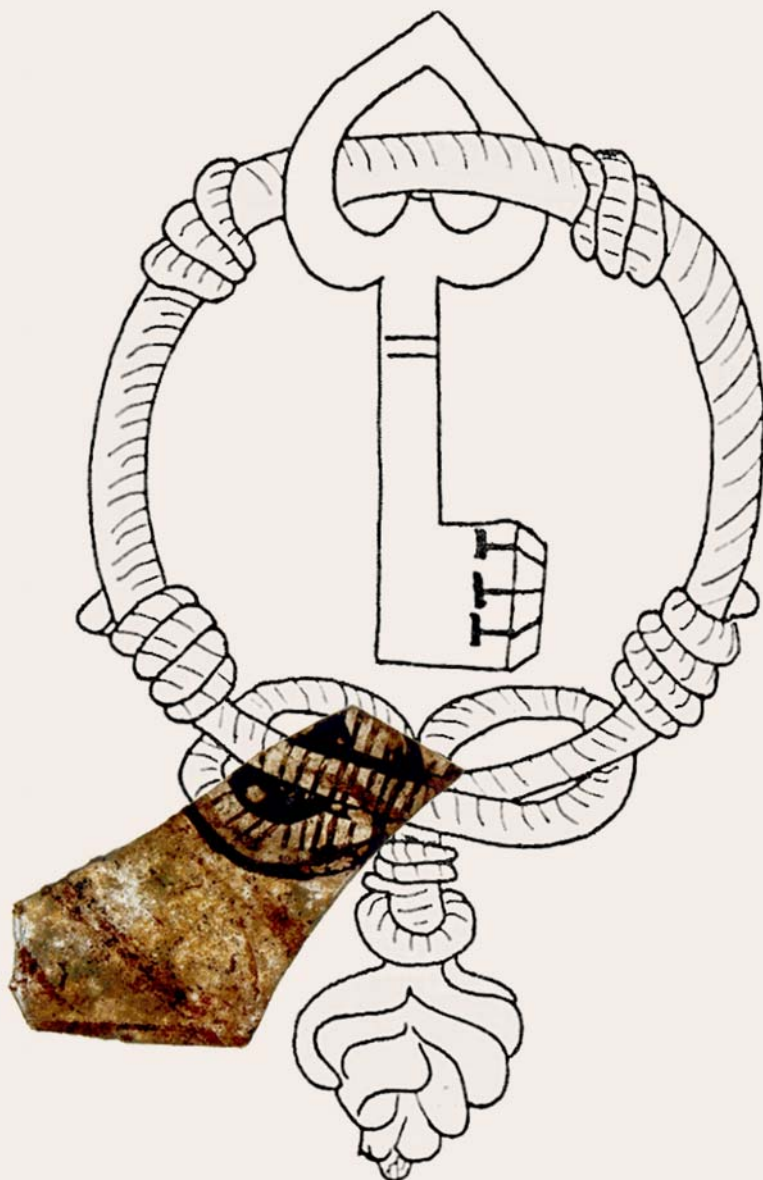


# BASING HOUSE, OLD BASING AND LYCHPIT, HAMPSHIRE

## CHEMICAL ANALYSIS OF EXCAVATED WINDOW GLASS

### TECHNOLOGY REPORT

David Dungworth



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NGR: SU 662 528

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ISSN 1749-8775

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## **SUMMARY**

The analysis of window glass fragments recovered during archaeological excavations on the site of Basing House provide information on the chemical composition of glass produced between 1531, when the house was built, and its destruction in 1645. Three of the fragments of window glass are forest glasses which would have been produced before the late 16th century. The remaining samples are high-lime low-alkali (HLLA) glasses. If made in England, these would have been produced after the arrival of French glassmakers in England in 1567. If made on mainland Europe, however, these glasses could have been produced at the time that the house was constructed. A fragment of HLLA glass decorated with the Paulet badge must have been made before 1550 and so is certainly an import. Basing House appears to have gone into decline during the 17th century and it is unlikely that any of the analysed window glass was made after c.1600.

## **ACKNOWLEDGEMENTS**

I would like to thank David Allen of Hampshire Museums Service who provided the window glass analysed.

## **ARCHIVE LOCATION**

Some of the archive, namely the mounted window glass fragments, are archived at Fort Cumberland, Portsmouth. Other material from the site is archived by Hampshire Museums Service at Chilcomb House, Winchester, Hampshire, SO23 8RD.

## **DATE OF RESEARCH**

2009

## **CONTACT DETAILS**

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## INTRODUCTION

Basing House was built during the 16th century, a licence to crenellate being granted to Sir William Paulet in 1531 (Allen and Anderson 1999, 4). William became the Marquess of Winchester in 1550 and died in 1572. The house received a number of royal visits during the 16th and early 17th centuries. Various documentary sources record visits by English monarchs in 1535, 1550, 1554, 1560, 1591, 1594, 1601 and 1603. These visits were no doubt essential for the Marquesses to develop and maintain their power at Court but they ultimately seem to have strained the family finances and by the 1630s the house was described as 'forsaken and desolate' (Allen and Anderson 1999, 5). Basing House was besieged during the English Civil War from 1643 to 1645. As the house held little strategic value and had been largely ruined by the long siege, Cromwell ordered that it be 'utterly slighted' (Allen and Anderson 1999, 7). The estates were seized by the Parliament but were returned to the Paulet family in 1662. The Paulets did not attempt to restore Basing House and no further building has taken place since.

The site of Basing House has been subjected to antiquarian and archaeological investigation for many years (eg Allen and Anderson 1999; Moorhouse 1970; 1971) although not all excavations have been published. While some archaeological evidence for medieval structures has been recovered, most evidence relates to the Tudor house and the Civil War siege. The range of artefactual evidence from the site is dominated by material produced between c1530 and c1645 (Moorhouse 1970; 1971).

## THE WINDOW GLASS

The various excavations on the site of Basing House have yielded substantial quantities of window glass (Allen and Anderson 1999, 76; Moorhouse 1971, 70–73). The glass analysed includes 28 undecorated fragments, two fragments painted with a Paulet badge, which was not used after 1550 (Moorhouse 1971, 70–72), and six fragments with the family motto *AIMEZ LOYALTYE*. The undecorated window glass is present as diamond quarries or panes, 'light transparent to a deep dense semi-opaque green colour' (Moorhouse 1971, 72). The history of this house outlined above suggests that most window glass from the Basing House excavations was installed during the 16th century. If it is assumed that building works (including the installation of new window glass) were concentrated in the periods immediately prior to royal visits, then most of the window glass should date to c1530–1540 and c1590.

## METHODS

All of the fragments of glass were mounted in epoxy resin and ground and polished to a 1-micron finish to expose a cross-section through the glass. The samples were inspected using an optical microscope (brightfield and darkfield illumination) to identify corroded and uncorroded regions. Most of the Basing House samples exhibited substantial corroded surfaces. The samples were analysed using two techniques to determine chemical composition: SEM-EDS and EDXRF. The energy dispersive X-ray spectrometer (EDS) attached to a scanning electron microscope (SEM) provided accurate analyses of a range of elements while the energy dispersive X-ray fluorescence (EDXRF) spectrometer provided improved sensitivity and accuracy for some minor elements (in particular manganese, iron, cobalt, nickel, copper, arsenic, rubidium, strontium and zirconium) due to improved peak to background ratios.

*Table 1. Minimum Detection limits (MDL) and analytical errors for each oxide*

	SEM-EDS		EDXRF		
	MDL	Error	MDL	Error	
Na <sub>2</sub> O	0.1	0.1	V <sub>2</sub> O <sub>5</sub>	0.02	0.03
MgO	0.1	0.1	Cr <sub>2</sub> O <sub>3</sub>	0.02	0.03
Al <sub>2</sub> O <sub>3</sub>	0.1	0.1	MnO	0.02	0.03
SiO <sub>2</sub>	0.1	0.2	Fe <sub>2</sub> O <sub>3</sub>	0.02	0.03
P <sub>2</sub> O <sub>5</sub>	0.1	0.1	CoO	0.02	0.02
SO <sub>3</sub>	0.1	0.1	NiO	0.02	0.03
Cl	0.1	0.1	CuO	0.02	0.01
K <sub>2</sub> O	0.1	0.1	ZnO	0.02	0.01
CaO	0.1	0.1	As <sub>2</sub> O <sub>3</sub>	0.02	0.01
TiO <sub>2</sub>	0.1	0.1	SnO <sub>2</sub>	0.1	0.05
BaO	0.2	0.1	Sb <sub>2</sub> O <sub>5</sub>	0.15	0.07
			Rb <sub>2</sub> O	0.005	0.005
			SrO	0.005	0.005
			ZrO <sub>2</sub>	0.005	0.005
			PbO	0.05	0.02

The SEM used was a FEI Inspect F which was operated at 25kV with a beam current of approximately 1.2nA. The X-ray spectra generated by the electron beam were detected using an Oxford Instruments X-act SDD detector. The quantification of detected elements was achieved using the Oxford Instruments INCA software. The EDS spectra were calibrated (optimised) using a cobalt standard. Deconvolution of the X-ray spectra and quantification of elements was improved by profile optimisation and element standardisation using pure elements and compounds (MAC standards). The chemical composition of the samples is presented in this report as stoichiometric oxides with oxide weight percent concentrations based on likely valence states (the exception being chlorine which is expressed as element wt%). The EDXRF used was an EDAX Eagle II which was operated at 40kV with a current of 1mA. The Eagle II was fitted with a glass capillary to focus the X-Ray beam on an area approximately 0.3mm in diameter. The

accuracy of the quantification of all oxides was checked by analysing a wide range reference materials (Corning, NIST, DGG and Newton/Pilkington). A few elements were sought but not detected: vanadium, chromium, cobalt and nickel. The compositional data has been normalised to 100%.

## RESULTS

The glass samples have been divided into a number of groups based on the absence or presence of painted decoration (Motto and Paulet badge). In addition further groups have been identified on the basis of the chemical composition of the glass (see appendix for full results).

### Undecorated Glass

Most fragments of undecorated Basing House window glass contain relatively low concentrations of alkalis (in most cases the sodium and potassium oxides combined account for less than 10wt% of the glass) and high concentrations of lime (mostly  $\text{CaO} > 20\text{wt}\%$ ). As such, these glasses are classified as high-lime low-alkali (HLLA) glasses (Table 2). There is a group of 12 HLLA glasses (samples 5, 6, 14, 15, 17, 18, and 22–27) which share very nearly the same composition (Table 1). These were probably made at one glasshouse at the same time and probably represent a major glazing episode at Basing House. The other HLLA glass fragments show a wider range of compositions and probably represent later piecemeal repairs. Only two fragments of undecorated glass (samples 3 and 11) contain sufficiently high levels of potassium oxide to indicate that they are forest glass. They do not share the same chemical composition and they were probably made at different glasshouses and may have been made at different times.

*Table 2. Composition (average and standard deviation of selected oxides) of the 12 HLLA glass samples which share nearly the same composition*

	Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	Cl	K <sub>2</sub> O	CaO	TiO <sub>2</sub>	MnO	Fe <sub>2</sub> O <sub>3</sub>	BaO
Mean	0.8	3.6	4.4	57.6	2.1	0.19	0.20	7.2	21.3	0.24	0.96	0.90	0.32
sd	0.3	0.4	0.4	1.2	0.2	0.06	0.12	0.8	1.4	0.05	0.11	0.13	0.06

### Decorated Glass

The eight fragments of decorated glass fragments include one forest glass (sample 36, Paulet badge) and seven HLLA glass. The decorated HLLA glass includes samples with widely varying chemical composition and none match the HLLA glass identified above as representing a major glazing episode.

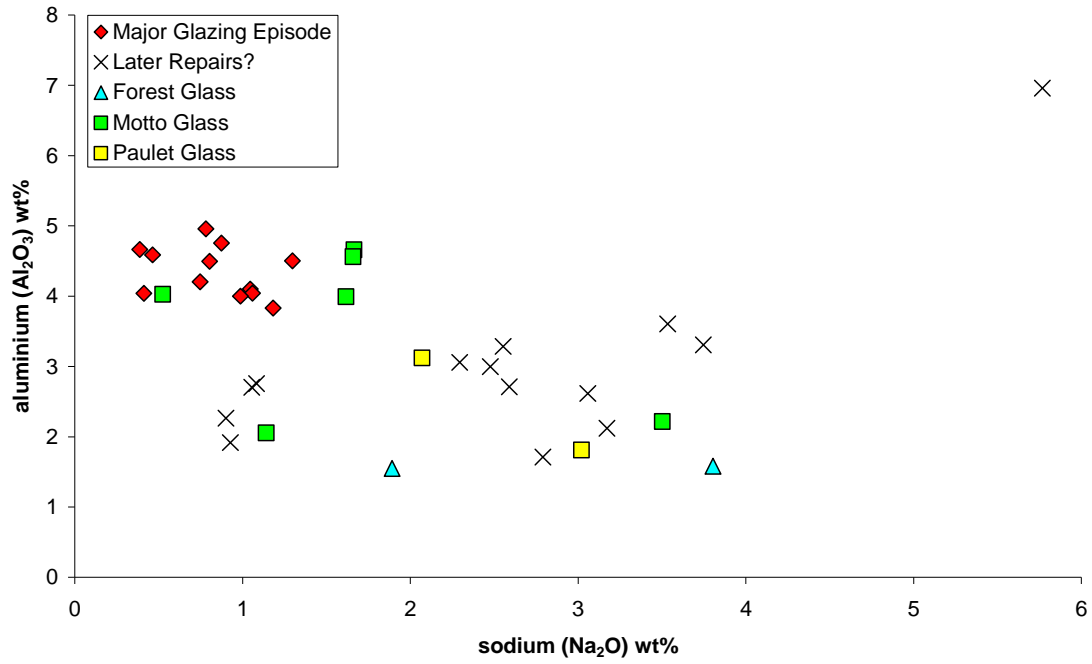


Figure 1. Sodium and aluminium content of the Basing House window glass

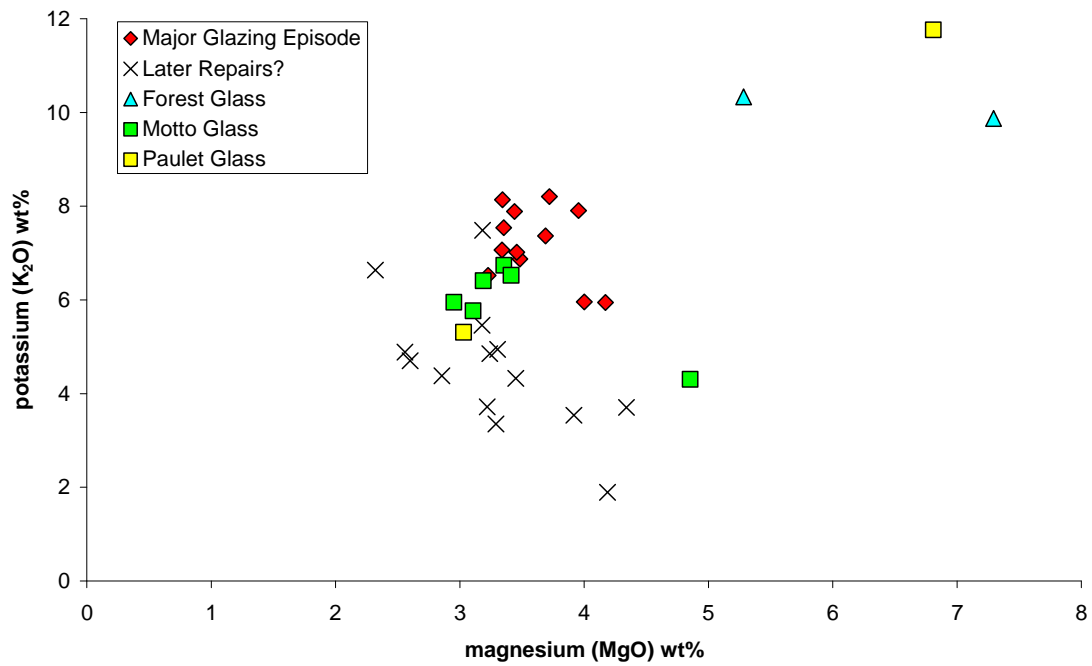


Figure 2. Magnesium and potassium content of the Basing House window glass



## DISCUSSION

The Basing House window glass includes examples of both forest and HLLA glass. Some of this glass may represent glass installed during the 1531 construction while some may represent later replacements (possibly as late as 1645). A major glazing episode is suggested by the 12 HLLA samples which share a similar composition (Table 2). Identifying the date when this glass was manufactured is hampered by a number of factors. While a significant change occurred in English glass manufacturing technology in 1567 (forest glass to HLLA glass) this occurred earlier on mainland Europe and glass was imported to Britain during this period (especially for high-status buildings).

It is known from late medieval and early post-medieval documents that window glass was obtained from both English producers as well as those in mainland Europe. A 15th-century contract for the glazing of the Countess of Warwick's chapel specified that the glazier 'use no glass of England, but glass from beyond seas'. Various 15th-century contracts for the glazing of York Minster specify that the white glass (that is, glass which was not deliberately coloured) be obtained from England (Marks 1993).

The Basing House window glass includes three samples which were made using a forest glass. In England this type of glass was manufactured throughout the medieval period but its production was superseded by HLLA glass with the arrival of French glassmakers from 1567 (Dungworth and Clark 2004). This glass probably represents at least some of the glass used during the 1531 construction.

Most of the Basing House window glass is HLLA glass. This type of glass was manufactured in England from roughly 1567 to 1700 but it was also produced in mainland Europe from the 14th century (Barrera and Velde 1989; Wedepohl 1997). The fact that one fragment of Paulet badge glass is a HLLA glass confirms that such glass was available in Britain prior to 1567. It also suggests that at least some of the glass for Basing House was imported from mainland Europe.

*Table 3. Composition of Basing House HLLA window glass (major glazing episode) and other 16th- and 17th-century HLLA glass*

*(1 = this report; 2 = Dungworth 2007; 3 = Dungworth and Clark 2004; 4 = Dungworth 2010; 5 = Mortimer 1993; 6 = Dungworth 2009)*

		Date	Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CaO	MnO	Fe <sub>2</sub> O <sub>3</sub>
Basing House	1	?1590	0.8	3.6	4.4	57.6	2.1	7.2	21.3	1.0	0.9
June Hill	2	1567–1610	1.2	4.1	2.2	61.1	2.2	7.7	18.8	0.9	0.8
Tanland	3	1567–1610	1.5	2.8	2.2	61.2	2.2	3.8	24.2	0.7	1.2
Newent	4	1599–1615?	2.0	3.7	4.4	56.8	2.5	8.1	19.7	0.3	1.4
Chastleton A	5	1607–1612	1.7	2.3	3.4	59.7	2.8	7.2	20.0	0.2	1.7
Chastleton B	5	1607–1612	3.9	3.4	4.3	59.6	1.1	2.7	20.7	0.2	1.3
Basing Grange	6	c1677	1.0	2.0	2.5	60.3	2.1	6.3	23.8	0.2	1.2

Twelve HLLA glass fragments share similar compositions (Table 2) and are interpreted as a major glazing episode. This glass shares a relatively high manganese concentration (0.7–1.0wt% MnO) with HLLA glass manufactured in the 16th century (Table 3), while most 17th-century HLLA glass contains lower concentrations of manganese (0.1–0.3wt% MnO). Therefore, a 16th-century date is more likely for this glass than a 17th-century date. Much of the HLLA glass identified as likely later replacements contains low concentrations of manganese which would be consistent with replacement glass produced in the early 17th century.

The chemical composition of the HLLA glass used for the major glazing episode at Basing House does not exhibit any characteristics which would indicate whether it was produced in England or mainland Europe (Table 4). The Basing House glass contains on average slightly more aluminium and potassium than the mainland European glass but the differences are too slight to be conclusive.

*Table 4. Composition of Basing House HLLA window glass (major glazing episode) and European late medieval and post-medieval HLLA glass (1 = this report; 2 = Wedepohl 1997; 3 = Hartmann 1994; 4 = Barrera and Velde 1989)*

		Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	CaO	MnO	Fe <sub>2</sub> O <sub>3</sub>
Basing House	1	0.8±0.3	3.6±0.4	4.4±0.4	2.1±0.2	7.2±0.8	21.3±1.4	1.0±0.1	0.9±0.1
Höxter	2	2.5±0.7	4.1±0.6	2.3±0.6	3.7±0.9	5.7±1.3	24.5±2.5	1.3±0.5	0.7±0.3
Eichsfeld	3	3.5±1.0	3.1±0.4	3.7±0.6	2.6±0.4	3.9±1.1	21.1±1.7	0.9±0.3	1.1±0.2
France	4	0.2±0.1	2.3±0.3	1.9±0.5	2.2±0.4	5.4±1.1	24.6±1.7	1.6±0.9	0.3±0.3

## CONCLUSIONS

The analysis of the window glass from Basing House provides information about the chemical composition of window glass produced between 1531 and 1645. Only three fragments of window glass have a forest glass composition and therefore must predate 1567. The remaining fragments are HLLA glasses and, depending on whether they were made in England or on mainland Europe, could have been made at any time within the period 1531–1645. The HLLA Paulet badge glass must have been produced before 1550 and on present evidence must be an example of glass produced in mainland Europe and imported to England. The remaining HLLA glass could have been produced in mainland Europe as early as 1531 or in England from 1567. Most of the HLLA glass contains sufficient manganese to indicate that it was probably produced before the end of the 16th century. A few fragments contain low concentrations of manganese and probably represent early 17th-century replacements.

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## APPENDIX: CHEMICAL COMPOSITION OF ANALYSED SAMPLES

ID	Type	Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	Cl	K <sub>2</sub> O	CaO	TiO <sub>2</sub>	MnO	Fe <sub>2</sub> O <sub>3</sub>	CuO	ZnO	As <sub>2</sub> O <sub>3</sub>	Rb <sub>2</sub> O	SrO	ZrO <sub>2</sub>	BaO	PbO
1	Undecorated	0.98	2.28	2.85	59.52	2.45	0.32	0.14	6.44	22.72	0.21	0.28	1.56	<0.02	0.02	<0.02	0.011	0.072	0.022	<0.1	<0.05
2	Undecorated	2.27	3.27	3.17	60.26	2.57	0.18	0.58	4.79	20.96	0.14	0.85	0.62	<0.02	0.02	0.02	<0.005	0.084	0.015	0.17	<0.05
3	Undecorated	3.87	7.29	1.64	54.91	3.45	0.17	0.51	9.63	16.63	0.14	0.86	0.61	<0.02	0.02	<0.02	0.033	0.048	0.014	0.11	<0.05
4	Undecorated	3.18	3.87	2.19	57.51	3.40	0.30	0.47	3.40	23.07	0.18	1.17	0.79	<0.02	0.04	<0.02	0.006	0.108	0.024	0.24	<0.05
5	Undecorated	1.09	3.65	3.97	59.56	1.98	0.10	0.25	7.16	19.72	0.13	1.09	0.77	<0.02	<0.02	<0.02	0.015	0.078	0.014	0.37	<0.05
6	Undecorated	0.95	3.30	4.25	58.80	2.10	0.16	0.23	6.86	20.85	0.26	1.07	0.66	<0.02	<0.02	0.03	0.016	0.066	0.024	0.35	<0.05
7	Undecorated	2.58	2.56	2.81	58.04	2.30	0.23	0.50	4.55	24.33	0.19	0.26	1.42	<0.02	0.02	<0.02	0.007	0.077	0.023	<0.1	<0.05
8	Undecorated	3.80	3.15	3.42	57.20	2.11	0.16	0.49	7.27	20.43	0.22	0.09	1.41	<0.02	0.04	<0.02	0.006	0.138	0.026	<0.1	<0.05
9	Undecorated	5.92	4.14	7.19	55.46	2.23	<0.1	1.29	1.79	18.79	0.30	0.28	2.25	<0.02	0.03	<0.02	<0.005	0.078	0.023	0.12	<0.05
10	Undecorated	0.96	2.52	2.80	58.11	2.30	0.41	0.11	4.73	25.70	0.21	0.40	1.46	<0.02	<0.02	<0.02	0.006	0.071	0.022	0.10	0.06
11	Undecorated	1.85	5.27	1.61	56.90	3.37	0.18	0.49	10.09	18.03	0.15	0.95	0.64	<0.02	0.03	0.02	0.013	0.078	0.021	0.20	0.10
12	Undecorated	2.54	3.41	3.40	57.85	2.68	0.47	0.41	4.18	22.70	0.22	0.83	0.83	<0.02	<0.02	<0.02	<0.005	0.082	0.022	0.33	<0.05
13	Undecorated	2.46	3.20	3.10	60.55	2.45	0.21	0.60	4.69	20.70	0.11	0.90	0.58	<0.02	0.03	0.03	0.010	0.111	0.016	0.23	<0.05
14	Undecorated	1.21	3.44	4.66	57.08	2.36	0.05	0.28	6.67	21.66	0.22	0.93	1.03	<0.02	<0.02	0.02	0.014	0.073	0.018	0.25	<0.05
15	Undecorated	0.96	3.97	4.19	56.90	2.44	0.18	0.20	5.78	22.78	0.24	1.00	0.95	<0.02	<0.02	0.02	0.012	0.071	0.022	0.26	<0.05
16	Undecorated	3.58	3.19	3.74	57.73	2.48	0.21	0.64	3.59	22.29	0.16	0.80	1.10	<0.02	<0.02	<0.02	<0.005	0.075	0.019	0.37	<0.05
17	Undecorated	0.33	3.40	4.76	57.87	2.27	0.17	0.05	7.67	20.50	0.28	1.10	1.05	<0.02	<0.02	<0.02	0.017	0.074	0.023	0.39	<0.05
18	Undecorated	0.89	4.14	4.14	56.53	2.56	0.07	0.17	5.76	23.08	0.24	0.99	0.95	<0.02	<0.02	0.02	0.012	0.072	0.021	0.32	<0.05
19	Undecorated	0.79	2.81	2.34	60.02	2.00	0.22	0.08	4.23	25.08	0.25	0.65	1.20	<0.02	<0.02	0.05	0.006	0.089	0.028	<0.1	0.06
20	Undecorated	0.82	3.14	1.99	59.61	2.05	0.27	0.08	5.29	24.19	0.27	0.92	0.99	<0.02	<0.02	0.05	0.007	0.099	0.037	0.13	<0.05
21	Undecorated	3.07	4.30	2.70	57.89	2.54	0.36	0.43	3.57	22.21	0.33	0.97	0.96	<0.02	<0.02	<0.02	0.007	0.103	0.041	0.45	<0.05
22	Undecorated	0.63	3.19	4.35	58.11	2.07	0.14	0.15	6.33	22.32	0.30	1.01	0.98	<0.02	<0.02	<0.02	0.013	0.065	0.024	0.27	<0.05
23	Undecorated	0.28	3.69	4.19	56.14	1.95	0.16	<0.05	7.99	23.13	0.26	0.90	0.86	0.02	<0.02	0.03	0.015	0.057	0.019	0.27	<0.05
24	Undecorated	0.77	3.32	4.93	57.73	1.99	0.15	0.18	7.33	20.94	0.26	0.98	0.88	<0.02	<0.02	0.02	0.015	0.071	0.019	0.39	<0.05
25	Undecorated	0.25	3.92	4.83	58.67	1.90	0.19	<0.05	7.69	19.83	0.19	1.01	0.94	<0.02	<0.02	0.02	0.015	0.068	0.021	0.39	<0.05
26	Undecorated	0.69	3.43	4.66	57.25	2.01	0.10	0.20	6.83	22.69	0.18	0.66	0.86	<0.02	<0.02	0.03	0.017	0.052	0.018	0.30	<0.05

ID	Type	Na <sub>2</sub> O	MgO	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	Cl	K <sub>2</sub> O	CaO	TiO <sub>2</sub>	MnO	Fe <sub>2</sub> O <sub>3</sub>	CuO	ZnO	As <sub>2</sub> O <sub>3</sub>	Rb <sub>2</sub> O	SrO	ZrO <sub>2</sub>	BaO	PbO
27	Undecorated	0.67	3.31	5.14	57.90	2.11	0.19	<0.05	7.92	20.04	0.27	0.96	1.11	<0.02	<0.02	0.02	0.016	0.059	0.014	0.27	<0.05
28	Motto	3.53	4.82	2.29	55.16	3.33	0.15	0.65	4.16	22.81	0.10	1.30	0.72	<0.02	0.04	<0.02	0.006	0.111	0.019	0.77	<0.05
29	Motto	0.41	3.17	4.19	59.83	1.80	0.17	0.11	6.26	18.95	0.22	1.01	0.89	1.90	0.51	0.05	0.007	0.064	0.021	0.37	0.05
30	Motto	1.60	3.07	4.83	58.87	2.15	0.10	0.37	5.59	21.25	0.21	0.74	0.86	<0.02	<0.02	<0.02	0.009	0.058	0.023	0.21	<0.05
31	Motto	1.55	3.32	4.14	59.20	2.20	0.15	0.37	6.56	20.30	0.16	0.95	0.67	<0.02	<0.02	<0.02	0.014	0.071	0.015	0.28	<0.05
32	Motto	1.05	3.38	2.13	57.99	2.33	0.30	0.06	6.34	23.43	0.13	1.54	0.75	0.03	0.02	<0.02	0.018	0.107	0.020	0.31	0.06
33	Motto	1.60	2.92	4.73	58.34	2.14	<0.1	0.34	5.77	21.91	0.22	0.76	0.87	<0.02	<0.02	<0.02	0.012	0.064	0.013	0.21	<0.05
34	Undecorated	2.79	3.29	1.71	57.65	3.05	0.42	0.64	3.35	25.69	0.19	0.54	0.51	<0.02	0.02	<0.02	<0.005	0.065	0.030	<0.1	<0.05
35	Paulet badge	2.07	3.03	3.12	59.65	2.50	0.15	0.65	5.31	21.93	0.14	0.67	0.53	<0.02	<0.02	<0.02	0.008	0.052	0.025	<0.1	<0.05
36	Paulet badge	3.02	6.81	1.81	55.93	3.08	0.20	0.59	11.76	14.85	0.18	0.83	0.71	0.06	0.06	<0.02	0.028	0.041	0.027	<0.1	0.19



## **ENGLISH HERITAGE RESEARCH DEPARTMENT**

*English Heritage undertakes and commissions research into the historic environment, and the issues that affect its condition and survival, in order to provide the understanding necessary for informed policy and decision making, for sustainable management, and to promote the widest access, appreciation and enjoyment of our heritage.*

*The Research Department provides English Heritage with this capacity in the fields of buildings history, archaeology, and landscape history. It brings together seven teams with complementary investigative and analytical skills to provide integrated research expertise across the range of the historic environment. These are:*

- \* Aerial Survey and Investigation*
- \* Archaeological Projects (excavation)*
- \* Archaeological Science*
- \* Archaeological Survey and Investigation (landscape analysis)*
- \* Architectural Investigation*
- \* Imaging, Graphics and Survey (including measured and metric survey, and photography)*
- \* Survey of London*

*The Research Department undertakes a wide range of investigative and analytical projects, and provides quality assurance and management support for externally-commissioned research. We aim for innovative work of the highest quality which will set agendas and standards for the historic environment sector. In support of this, and to build capacity and promote best practice in the sector, we also publish guidance and provide advice and training. We support outreach and education activities and build these in to our projects and programmes wherever possible.*

*We make the results of our work available through the Research Department Report Series, and through journal publications and monographs. Our publication Research News, which appears three times a year, aims to keep our partners within and outside English Heritage up-to-date with our projects and activities. A full list of Research Department Reports, with abstracts and information on how to obtain copies, may be found on [www.english-heritage.org.uk/researchreports](http://www.english-heritage.org.uk/researchreports)*

*For further information visit [www.english-heritage.org.uk](http://www.english-heritage.org.uk)*

