Assessment of Metalworking Wastes

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1.0 INTRODUCTION

Metalworking debris was recovered from a variety of contexts, dating from the Roman to the medieval period. This assessment aims to evaluate the main material types present and determine what further analysis should be considered to support the best interpretation of the site.

2.0 ASSESSMENT

2.1 BLUE BRIDGE LANE

The site at Blue Bridge Lane has 746 small finds of metalworking waste, weighing just over 40kg in total. Most of these samples are small, 656 of them weigh less than 100g, and 120 are tiny >hammerscale= samples retrieved from environmental sieving. 28 of the larger samples and 21 of the smaller samples were examined briefly (Table 1).

Table 1. Assessment of selected residues

Find	Feature		Spot Date	Description of Context	Weight (g)	Identification
323		1022		Secondary Layer	434	250g ssl, 173g glass waste
326	4	1029		Secondary Backfill of Robber Pit	66	ssl
330	13	1063		Secondary Backfill of Pit	538	shb
331	4	1028	Med 11th to 12th	Secondary Backfill of Robber Pit	376	ssl
332	13	1027		Secondary Recovery Context from Pit	540	ssl (two lumps)
2832			Med	Backfill of terracing cut	11	?mould ?other mworking
2833			Late Med	Backfill of Scoop	12	soft-fired white clay, not mworking
5011		1221	E mod	Secondary Garden Soil Layer	110	fc (over-fired)
5012		1227	19th+	Secondary Garden Soil Layer	524	ssl (one large lump)
5046		1385	Med 14th+	Buried Soil	1264	ssl (mostly one big lump)
5071	353	1449	Asax	Secondary Backfill of Pit	702	ssl (many small lumps)
5084	225	1491	Med 14th+	Secondary Backfill of Kiln	486	386g shb, w= 105, d = 45)
5088	226	1492	Med 14th+	Secondary Backfill of Posthole	452	ssl
5096	239	1514	?Pmed L15th+	Secondary Backfill of Pit	966	ssl
5126	269	1592	Med 12th to 13th+	Secondary Backfill of Pit	122	charcoal

5161	303	1677		Backfill of Pit	420	ssl or shb?
5177	321	1707		Secondary Backfill of Posthole	476	shb (1 example, w=105, d = 42)
5185	77	1743	Med 13th to14th+	Primary Fill of Pit	1352	ssl mostly, plus 152g vhl
5218	381	1851	Asax	Secondary Backfill of Pit	390	284g = ssl, 22g = fc, 65g = wattle
5221	381	1858	Roman	Primary Fill of Pit	588	shb (1 example, w=130, d = 65)
5222	381	1861	Med 12th+	Recovery Context from Pit	614	389g = shb (w = 100, d = 40) plus ssl
5228	402	1883	Asax	Secondary Backfill of Pit	508	ssl and shb?
5245	442	1951	Asax / Med 13th+	Primary Backfill of Pit	1264	ssl, vhl (small chunks)
5246	442	1951	Asax / Med 13th+	Primary Backfill of Pit	1822	ssl (large chunks)
5251	458	1969	Med 14th+	Secondary Backfill of Pit	350	ssl, mostly small
5261	442	2024		Secondary Backfill of Pit	1532	ssl
5271	381	2054	Roman L2nd+	Secondary Dump in Pit	632	shb (1 example w = 110, d = 75), including Fe-rich item
5289	273	2103	Roman	Secondary Backfill of Pit	498	ssl (one large lump)
5308	4	H. scale 1006	Med 12th+	Secondary Backfill of Robber Pit	<1	magn debris and fl hs
5332	13	1147	Asax	Secondary Fill of Pit	6	vhl
5348		H. scale 1286		Seconadry Spread of Soil and Tile Deposit	4	sph hs, fl hs and magn debris
5359		H. scale 1331	Med 13th-14th	Secondary Layer sealing Feature 164	<1	magn debris
5363	150	H. scale 1334	Med 11th to 12th	Secondary Backfill of Pit	4	vhl
5367	178	H. scale 1336	Med 13th	Secondary Backfill of Scoop	<1	magn debris and ?sph hs
5372	150	H. scale 1339	Med 11th+	Primary Fill of Pit	<1	magn debris, sph hs and fl hs
5410	215	1435	Med 14th+	Secondary Backfill of Pit	8	vhl
5417	198	H. scale 1442	Med 14th+	Primary Backfill of Pit	<1	fc
5426	223	H. scale 1484	Med 12th / 14th+	Secondary Backfill of Pit	4	sph hs, fl hs and magn debris
5440	218	1515	Med 12th to 13th	Primary Fill of Pit	<1	vhl
5465	143	H. scale 1534		Secondary Backfill of Pit	<1	magn debris and sph hs
5468		H. scale 1541	Med 12th to 13th	Secondary layer	4	magn debris and sph hs
5516	351	H. scale 1763	Med 11th+	Fill of Pit	6	sph hs, fl hs and magn debris
5576	13	1908	Roman	Fill of Pit	14	dense slag and vhl
5578	397	H scale 1909		Primary Fill of Pit	<1	mag deb and fl hs
5595	458	H. scale 1973	Asax / Med 13th+	Primary Fill of Pit	6	magn debris and ?fl hs
5599	458	H. scale 1974		Primary Fill of Pit	4	magn debris

5679	546	H. scale 2195	'Roman / Med 14th +	Primary Fill of Pit	4	magn debris and sph hs
5688		H. scale 2205	Roman ?1st to 2nd	Secondary Layer	4	magn debris and sph hs
6085	241	H. scale 1517	Asax	Primary Backfill of Pit	<1	magn debris and fl hs
6233			Asax	Backfill of Pit	82	tuyere

fc-fired clay; *Fe* - iron; *fl hs flake* – hammerscale; *hs* - hammerscale, *magn* – magnetic; *shb* - smithing hearth bottom (weight (g), width and depth (mm) given, where possible); *sph hs* - spherical hammerscale; *ssl* - smithing slag lumps; *vhl* - vitrified hearth lining

The majority of the material is ironworking debris, mostly in the form of smithing slags, including some smithing hearth bottoms (eg sf330, 5084, 5177, 5221, 5222 and 5271) with their distinctive plano-convex form. Other slag examined is not so diagnostic but also likely to be from smithing; no evidence diagnostic of iron smelting was detected amongst the samples. Fired and vitrified clay were also observed, showing varying degrees of heating. Some of this material is likely to be related to the ironworking, although other high-temperature activities could produce this type of material. Both spherical and flake hammerscale were observed amongst the samples, although some of the >hammerscale= samples are in relatively chunky shapes and is probably actually from decaying, rusted artefacts. Hammerscale is produced during ironworking, typically when tiny droplets are driven from iron billets during initial shaping (spherical hammerscale) or when flakes come off objects during final shaping (flake hammerscale).

A well-preserved tuyère (sf 6233) is vitrified on one side and oxidised on the other. The once-central hole has a diameter of about 15mm. It is possible that the tuyère may have been made of two pieces of clay, as there seems to be a prepared surface running radially from the central hole.

A ceramic item (sf2832) requires further analysis. It is small, weighing 11g, with a 43mm maximum dimension, reduced-fired, with thin (5mm) walls and has an enclosed, possibly triangular shape. Inside there is a dark deposit. It is a curious shape for a mould, and if it is a mould, must have been from an investment mould. There are some other possibilities, including precious metal processing or assaying (based in the dark deposit). The best way of testing this possibility is surface X-ray fluorescence, a quick and non-destructive technique available at a number of laboratories.

Sf 323 comprises some smithing slag and a large lump (173g) of glassworking waste. This latter is a small piece of dense, reduced fired clay material (probably crucible), with thick layers of green-ish glass and white, quartz-rich material attached. This certainly appears to be post-medieval in date, on a typological basis, and may well have come from the Redfearn glass factory, active at the neighbouring Fishergate site from the 18th to the 20th century.

2.2 FISHERGATE HOUSE

This smaller site has 50 small finds of metalworking waste, totalling just over 5kg, with one of the samples (sf868) weighing more than 2kg. Nine of the larger samples were investigated (Table 2). The material at Fishergate House was similar to the Blue Bridge Lane material, with most of the examined samples being smithing slag lumps and vitrified hearth lining.

Table 2. Assessment of selected residues

Find No.	Feature No.	Context No.	Spot Date	Description of Context	Weight (g)	ID
880	64	1338	Med C13th+	Secondary fill of pit	236	slag
884	64	1345	Asax / Ascan	Secondary backfill of pit	188	slag
864	102	1195		Secondary backfill of grave cut	106	slag

869	125	1240	Asax	Primary fill of pit	204	slag
879	177	1335	Ascan	Secondary backfill of pit	142	slag
857	64	1120	Asax	Secondary backfill of pit	318	slag and vhl
868	125	1239	Asax / Ascan	Primary fill of pit	2136	slag, ssl and vhl
885	64	1349	Asax	Secondary backfill of pit - possible lining (grey)	126	ssl and vhl
1430	125	1240	Asax	Primary fill of pit	138	ssl and vhl

fc-fired clay; *Fe* - iron; *fl hs flake* – hammerscale; *hs* - hammerscale, *magn* – magnetic; *shb* - smithing hearth bottom (weight (g), width and depth (mm) given, where possible); *sph hs* - spherical hammerscale; *ssl* - smithing slag lumps; *vhl* - vitrified hearth lining

3.0 ASSESSMENT OF POTENTIAL FOR FURTHER ANALYSIS

The metalworking debris at these sites is of a typical type and of a moderate quantity for urban sites. Clearly ironworking was going on relatively close by, during several periods of activity but all of the debris is redeposited, with no in-situ structural evidence for metalworking furnaces/hearths at the site. The overall quantities of slag recovered (45kg) can be seen as relatively small, compared with various sites in York (excavated areas/volumes vary);

Coppergate	248kg	Roman, Anglo-Scan to medieval (McDonnell 1992)
Fishergate	172kg	Anglo-Scan to medieval (McDonnell and Heyworth 1993)
Walmgate	138kg	medieval and late-medieval (MacNab 2003)
St Andrewgate	94.5kg	medieval and late medieval (Mortimer 2004)

Similarly, although there are many samples of >hammerscale=, the total weight is small and this could just have been brought in attached to or mixed with the smithing slags.

Nonetheless about 16.3kg of slag comes from contexts with Anglo-Saxon/Anglo-Scandinavian dates. This means that these two sites represent an opportunity to discover a little more about the ferrous metalworking of the wic period, which is the focus for the excavation report; it is of course logical to examine material from all periods. In particular, the overall balance of iron-working debris types can be compared with those at Fishergate - along with other industrial debris at each site - to see if the new sites can be seen as the edge of the industrial activities at Fishergate. The remaining slag samples could be individually examined, identified and weighed. The hammerscale samples require no further work, although some analysis could be done to establish its distribution.

Other work required includes surface XRF analysis for sf2832. Illustration is not necessary for any of the ironworking debris, but is recommended for the tuyère, the mould/refining vessel and the glassworking waste. The other material is robust and needs little further conservation or preparation for storage.
