THAMES VALLEY ARCHAEOLOGICAL SERVICES

Late Bronze Age occupation, Middle Iron Age occupation and iron production, and Roman ditches at Crosfields School, Shinfield Road, Reading, Berkshire

An archaeological excavation

By Steve Ford

CSR18/83
(SU 7313 6958)

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An Archaeological Excavation

Draft Publication Report

for Crosfields School

by Steve Ford

Thames Valley Archaeological Services Ltd

Site Code CSR 18/83

Summary

Site name: Land at Crosfields School, Shinfield Road, Reading, Berkshire

Grid reference: SU 7313 6958

Site activity: Excavation

Project Coordinator: Tim Dawson

Site supervisor: Steve Ford

Site code: CSR18/83

Area of site: *c*. 0.173 hectares

Summary of results: The excavation revealed four phases of activity. The earliest comprised a post-built roundhouse of Late Bronze Age date with a radiocarbon determination of 926–814 cal BC followed by an Early Iron Age pit with a date of 592–409 cal BC. The Middle Iron Age was represented by a ring gully complex associated with iron production. The chronology of this activity is supported by two radiocarbon dates of 360–163 cal BC and 359–175 cal BC. The final phase was represented by Roman ditches and gullies considered to form part of a field system.

Despite the small size of the excavation and modest range of deposits revealed, there are two notable components of the results. The first is that the presence of small scale Middle Iron Age iron production is now a recurrent component of Iron Age settlement of the tertiary geological outcrops south of Reading. The second is the enhancement of the significance of the plateau edge overlooking the Kennet Valley for the location of Bronze Age, Iron Age and Roman settlement in south Reading.

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with contributions by David Dungworth, Elspeth St John-Brooks and Jane Timby

Report 18/83b

Introduction

An archaeological excavation was carried out by Thames Valley Archaeological Services on land at Crosfields School, Shinfield Road, Reading, Berkshire (SU 7313 6958) (Figs. 1 and 2). The work was commissioned by Mr Neil Boddington of Boddingtons Planning, Westfield House, 31 Shirburn Street, Watlington, Oxfordshire OX49 5BU on behalf of the School.

Planning permission (161911) has been gained from Wokingham Borough Council to construct a new Astroturf pitch and relocate a cricket pitch. The permission was subject to conditions relating to archaeology, which required the implementation of a programme of archaeological work prior to the commencement of groundworks, as guided by the *National Planning Policy Framework* (NPPF 2012) and the Borough Council's policies. The work was carried out according to a written scheme of investigation approved by Ms Ellie Leary of Berkshire Archaeology, advisers to the Borough on matters relating to archaeology, and was monitored by her on behalf of the council.

The stripping of the site, using a 360° type machine fitted with a toothless grading bucket took place under constant archaeological supervision between 13th and 20th August 2018. The archive is currently held by Thames Valley Archaeological Services in Reading, and will be deposited with a local museum willing to accept it in due course.

Topography and geology

The school is located to the south of Reading on the west side of Shinfield Road (Figs 1 and 2). The excavation site lies to the west of the school buildings on level ground at a height of *c*. 80m above Ordnance Datum. The ground drops steeply away to the west to form the side of the Kennet Valley/Foudry Brook with a more gentle slope away to the Loddon Valley to the east. The underlying geology is mapped as Black Park gravel (terrace 6) above London Clay, with the latter outcropping on the slope further to the west (BGS 2000). The gravel cap is shallow with small patches of the London Clay outcropping on the site. A spring is present 150m to the north-west.

Archaeological background

The archaeological potential of the site stems from its topographic position on the edge of the gravel terrace/plateau overlooking the valley of the Foundry Brook/Kennet Valley to the west. Previous fieldwork to the north has now recorded several sites in a similar topographic position on or about the *80*m contour with Middle/Late Bronze Age occupation recorded at Ridgeway School and Northcourt Avenue; Early and Middle Iron Age occupation at Ridgeway School and Cressingham Road, and Late Iron Age into Roman occupation at Northcourt Avenue and Ridgeway School. (Carlsson, 2010; Milbank, 2010; Ford, 2017a; Ford, 2018a)

Evaluation of the site (Ford 2018) confirmed the presence of deposits of Middle or Lat*e* Iron Age date on a small part of the development area. Trenches to the north-west on the steep slope revealed no archaeological deposits (Fig. 2).

The Excavation

The excavation eventually comprised the stripping of an area of overburden from an area of 0.173 hectares. The initial site area was extended to the north east to recover a full plan of a cluster of pits and post holes. The overburden typically comprised 0.2m of turf and topsoil above 0.05m of subsoil which was mechanically stripped to expose grey and brown sandy gravel, often cemented with some clay, with soft sand patches particularly to the west. The site was criss-crossed by land drains. This stripping revealed a modest volume of archaeological features, some unexpected. These comprised linear features and a ring gully along with a cluster of small pits and postholes (Pl. 1). Appendix 1 provides a summary of all of the excavated features.

Phase 1: Late Bronze Age

A dense cluster of shallow postholes and a few pits was located in the north-eastern part of the site. The cluster was only *c*. 10-12m across. These features were typically only 0.1-0.15m deep, with the deepest (posthole 130) just 0.23m deep (Fig. 4). Approximately half of the features contained highly fragmented and poorly dated prehistoric pottery, with all containing burnt flint in small amounts.

Roundhouse RH1

This probable structure comprised 7 postholes (126-130, 132-3) forming a near circular plan, 4.2m across. There is a gap in the circuit to the west, presumably occupied by a non-earthfast post or shallow hole now eroded away. A few other postholes lay to the south but do not obviously form a porch. Postholes 126 and 133 contained single sherds of pottery. A radiocarbon date was obtained on charcoal from posthole 130, of 926-814 cal BC (UBA-38813: Table 7) which is consistent with the pottery dating.

Other features

Postholes 122 and 123 were 1.2m apart and may represent a 2-post structure such ad a drying rack or tethering pole.

Phase 2: Early Iron Age

Pit 119 was 0.6m across and 0.13m deep, with a bowl-shaped profile. It contained a single fill (169) which was markedly charcoal-rich with flecks of fired clay and burnt flint. It contained three sherds of Early Iron Age pottery including a piece of distinctive finger-impressed decorated bowl. A radiocarbon date of 592–409 cal BC (UBA-38812, Table 7) on charcoal from this pit concords with the pottery dating. This pit fill was unlike those of other features in the nearby cluster and was an outlier (just). It is considered that this feature is an isolated event.

Phase 3: Middle Iron Age

The Middle Iron Age was represented by a ring gully, a ditch and a small number of pits and postholes.

<u>Ring gully 1 (Fig. 3; Pl. 2)</u>

This was a penannular gully in two separate segments. It was oval in plan between 13m and 17.2m across. It had a gap on the east side of 5.5m well defined by deep, purposefully dug terminals. The western gap, however, is not considered to be part of the original design but, instead, a product of erosion.

It was excavated by 11 slots (1, 100-110) which revealed it to be between 0.32m and 0.68m wide and between 0.06m and 0.30m deep (Pl. 3), the northern and western elements being markedly shallower than those in the south and east, reflecting erosion on the slope down to the west. It contained in all some 171 sherds of Middle Iron Age pottery, 295g of burnt flint, 26 fragments of fired clay/loomweight and 4.03kg of slag.

A radiocarbon date was obtained on charcoal from the ring gully (slot 102) of 360–163 cal BC (UBA-38810; Table 7) which is consistent with the pottery dating. It is suspected (no more) that the date falls within the earlier part of this range, purely to allow ditch A to be later (see below).

The ring gully encircled a single posthole (111), not central but possibly located inside the entrance way, which was dated by 60 sherds (small fragments) of Middle Iron Age pottery. A second posthole (115) lay centrally within the entrance way but was mostly truncated by ditch A.

<u>Ditch A</u>

Ditch A was aligned N-S and terminated at its northern end. Six slots (2, 112–14, 117, 148) showed that it was between 0.82m and 0.95m wide and between 0.12m and 0.31m deep with a shallow concave profile. It contained 17 sherds of Middle Iron Age pottery (including a surface find), 5498g of burnt flint and 2486g of slag. It cut posthole 115 and pit 116. Segment 112 (Pl. 4) was notable for its volume of burnt flint and it was considered that ditch had largely truncated a burnt-flint-filled pit similar to pit 116.

Ditch A cuts across the entrance of ring gully RG1 suggesting that the latter had gone out of use and that there is some time depth even to this simple layout. Ditch A does continue southwards beyond the site boundary and perhaps indicates the possibility that further Iron Age deposits are present in that direction. There is also a possibility that Ditch A is of Roman date and belongs to the field system represented by ditches B, C and D. Despite the volume of pottery, slag and burnt flint, this material could all be residual if the ditch had been cut through a midden. Mis-dating due to a similar level of residuality has been experienced and narrowly avoided by this author, at St Peters Hill, Caversham (Medieval ditch cutting BA midden) (Ford and Raymond 2013, 34) and Cippenham, Slough (Entwistle *et al*. 2003, fig. 42) (Roman ditch with much prehistoric pottery). Nevertheless, Ditch A has been well-sampled and more so than Ditch B, without recovering any Roman material, so an Iron Age date is preferred. A radiocarbon date was obtained on charcoal from slot 113, of 359–175 cal BC (UBA-38811, Table 7) which is consistent with the pottery dating, although if, as postulated, it is later than the ring gully, it may be within the later part of this range: the two radiocarbon dates are practically identical but with sufficiently wide ranges to mask a gap of a century or more.

Gully D

This gully is aligned E-W. It was 10m long with terminals that peter out at either end. It was investigated by four slots (142-5) which showed it was *c.* 0.4m wide and 0.1m deep. It contained 5 sherds of Middle Iron Age pottery. The gully seems to form a corner with Gully C, which is of Roman date and, as considered for ditch A, there is a possibility that the few finds here are residual.

Pits and postholes (Fig. 4)

Pit 116 was cut by ditch A. It was oval in plan, up to 1.9m long and 0.22m deep. It was steep-sided with a flat base. Its fill was distinctive, containing much burnt flint and a comminuted charcoal-rich fill. It also contained 637g of slag and 22 Middle Iron Age sherds.

Only 5 postholes were revealed which seem to relate to the Middle Iron Age use of the site. Postholes 4, 5 and 141 produced no dating evidence and 115 was dated only by reference to ditch A which cut it. Posthole 111 has been considered above as it lay within the ring gully.

Phase 3: Roman

The only deposits for this period are two linear features with a few stray pottery finds.

Ditch B was aligned E-W. It was *c.* 0.7m wide and 0.16m deep with a flat base. It contained 5sherds of later Roman pottery along with 3 Middle Iron Age sherds. Two Roman sherds were recovered from its surface. The ditch continues beyond either side of the main excavation area. However, an opportunity to observe a stripped area further to the east (Fig. 2 ‘wb’) did not reveal the ditch, which must have turned or terminated.

Gully C was aligned N-S. It was *c.* 0.3-0.4m wide and 0.1-0.15m deep with a v-shaped profile. It was *c.* 21m long and petered out to the south but butted ditch B to the north. It was investigated by five slots (3,138-40, 202) but only a single sherd of Roman pottery was recovered.

Finds

Pottery by Jane Timby

The excavation resulted in the recovery of some 324 sherds of pottery weighing 1479g with a further 14 sherds (35g) from the evaluation) accompanied by 10 fragments of fired clay (88g). The material can be dated to the later prehistoric and later Roman periods (Appendix 2).

The assemblage was sorted into fabrics based on the colour, texture and nature of the inclusions present in the clay following the PCRG (1997) and HE (2016) guidelines. Traded Roman wares are referenced to the National Roman fabric reference collection (Tomber and Dore 1998; http://romanpotterystudy.org/nrfrc/base/index.php). Freshly broken sherds were counted as single pieces.

The sorted assemblage was quantified by sherd count and weight for each recorded context (Appendix 2). In general terms the assemblage was in poor condition with a few instances of multiple sherds from single vessels and a low incidence of diagnostic sherds with which to refine a chronology. The overall average sherd weight was just 4.5g. Pottery was recovered from 25 cut features with the highest number of sherds, 122 pieces, 37 % count, coming from ring-gully 101. A total 35 sherds were unstratified.

<u>Later Prehistoric wares (Table 1)</u>

The later prehistoric sherds can be divided into five main ware groups: flint-tempered (FL), iron-rich sandy (SAFE), sandy with flint (SAFL), sandy with organic (SAOR) and sandy (SA).

Flint-tempered wares

FL1: moderately hard, oxidised ware with a moderate frequency of coarse, angular, calcined flint > 5 mm.

FL2: Hard, ware with a hackley fracture. Oxidised exterior with a black interior. A sparse frequency of angular, calcined flint up to 2 mm accompanied by rare, rounded quartz sand less than 0.5 mm.

FL3: fine sandy matrix with a sparse scatter of calcined flint up to 3mm and fine glauconitic sand less than 0.5 mm.

SAFL: sandy textured ware with sparse to rare inclusions of calcined flint up to 2 mm in size with a common frequency of well-sorted, rounded quartz and fine round black grains of glauconite. Some pieces have a smoothed exterior. No featured sherds.

Sandy

SA1: finely micaceous sandy, black ware with rare visible grains of rounded quartz < 0.5 mm.

SA2: brown with a black core and smoothed surfaces. The sandy matrix contains a common frequency of well-sorted glauconitic sand less than 0.5 mm with a sparse scatter of larger rounded, grains of quartz up to 1 mm and rare rounded clay pellets up to 1 mm.

Iron-rich

SAFE: iron-rich fine sandy fabric. Brown surface with a black core and interior. The matrix contains a moderate frequent of rounded, iron-rich, loosely consolidated concretions up to 2 mm across and less and rare flint. The interior surface is pocked with voids up to 2mm across.

SAFEFL1: dark brown or black, hard fabric with sparse ferruginous inclusions up to 3 mm, sparse iron-stained flint up to 2 mm and ill-sorted, rounded quartz up to 0.5 mm.

Organic

SAFOR: a moderately hard dark brown ware with a black core. Finely micaceous fabric with a moderate frequency of organic voids, ill-sorted quartz sand up to 0.5 mm.

SAFEOR: as SAFOR but with a sparse scatter of rounded ferruginous grains.

SAOR: sandy textured ware containing a sparse frequency of ill-sorted, rounded to sub-angular quartz sand less than 0.5 mm, rare fine flint and sparse fine organic inclusions. No featured sherds.

Most of the sherds, (35%), are in an iron-rich sandy ware (SAFE) with occasional sparse flint. The only featured sherds in this ware a slackly carinated bodysherd with finger-tip decoration from pit 119 and a simple flared rim jar from ring gully 102. Other featured sherds are sparse. The finer flint-tempered wares include a possible saucepan-style vessel, also from ring gully 102, and one sherd perforated after firing from posthole 133. A further saucepan-style vessel and a jar from pit 116 are both made from glauconitic sandy ware (SA2). The only other featured sherds are two jars in an iron-rich sandy ware with organic tempering from ring gully 101; one has a beaded rim; the other is a simple ovoid jar with an undifferentiated rim.

Table 1. Summary of excavation pre-Roman pottery by fabric.

	Fabric	Description	No	No %	Wt	Wt %
Flint	FL1	coarse flint	5	1.6	30	2.2
	FL2	medium flint	15	4.7	175	13.1
	FL3	fine flint	7	2.2	34	2.5
	SAFL	sandy with flint	25	7.8	89	6.7
Sandy	SA	misc sandy	2	0.6	5.5	0.4
	SA1	fine sandy	4	1.2	44	3.3
	SA2	glauconitic sandy	80	24.9	226	16.9
Iron-rich	SAFE	iron-rich sandy	17	5.3	155.5	11.6
	SAFEFL	iron-rich sandy with flint	7	2.2	56	4.2
Organic	SAFEOR	iron-rich sandy with organic	90	28.0	282	21.1
	SAFOR	fine sandy with organic	39	12.1	122	9.1
	SAOR	sandy with organic	30	9.3	116	8.7
TOTAL			**321**	**100.0**	**1335**	**100.0**

<u>Catalogue of illustrated sherds (Fig. 5)</u>

1. Two joining bodysherds from a carinated vessel with small oval depressions around the carination. Fabric: SAFE. The interior surface is pitted with voids where inclusions have leached out. Pit 119 (169).
2. Saucepan-style pot with a shallow incised groove around the rim. Fabric: FL3. Ring gully 102 (152).
3. Wide-mouthed globular-bodied jar. Red-brown with a black core. Fabric: SAFE. Ring gully 102 (152).
4. Round-bodied jar with a slightly expanded, rounded rim. Smoothed exterior. Fabric: SA2. Pit 116 (166).
5. Saucepan-style pot, Fabric: SA2. Pit 116 (166).

<u>Roman</u>

The Roman component of the assemblage is very small with just 13 sherds which include Alice Holt grey wares (ALH RE) and Oxfordshire colour-coated are (OXF RS). Six of these sherds are unstratified.

Chronology

The character of much of the later prehistoric assemblage suggests that it largely belongs to the Middle Iron Age. The decorated bodysherd from pit 119 is perhaps more typical of the later Bronze Age-early Iron Age but with so few diagnostic sherds across the group as a whole it is difficult to know if this is a stray sherd or that other features belong to this phase of occupation. The saucepan-style vessels and preponderance of sandy-based fabrics would be more typical of the Middle Iron Age. The Roman wares, although few in number, suggest a later Roman phase of activity.

Fired clay

Twenty one fragments (1082g) of fired clay were recovered from four Middle Iron Age features: ring gully 104, pit 116 and ditches A and D. Just one fragment (40g) from ring gully slot 1 (50) may have been a fragment from a loomweight. None of the remainder show any shape or are large enough to suggest any form or function for this material, which is however, considered likely to have been structural.

Struck Flint by Steve Ford

A small collection of struck flint was recovered from the excavation phase of the project. These comprised three flakes (from post hole 122, and ditch B slots 136 and 146) and a narrow flake from a silt patch. The narrow flake is probably a fortuitous by-product of flint knapping and not obviously a deliberate product of Mesolithic blade manufacture. The other flakes are not closely datable and are probably of Neolithic or Bronze Age date and residual, but *ad hoc* use of flint in Iron Age (and later) times is entirely plausible.

Burnt Flint

A total of 7164g of burnt flint was recovered during the course of the excavation. Most features contained small quantities but two slots (112, 114) across Middle Iron Age ditch A produced 5218g of this total.

Charred plant remains by Elspeth St John-Brooks

Bulk soil samples were taken from fifteen features for wet sieving by standard flotation methods. The resultant flots were examined under low power microscope. No charred plant remains other than charcoal were present. Charcoal was present in 12 of the samples, but in very small quantities, and fragments of identifiable size were absent, other than in samples 3 from ring gully slot 102 and 7 from pit 119, and in these only a very few fragments were over 1cm long. No meaningful analysis is possible.

Slag by David Dungworth

All of the material submitted for assessment was examined visually and recorded following standard guidance (Historic England 2015). Two samples were selected for scientific analysis. This was carried out on polished sections (see Vander Voort 1999 for details of sample preparation) which were imaged using a scanning electron microscope (SEM). In addition, selected areas were analysed (using an energy-dispersive spectrometer [EDS] attached to the SEM) to determine their chemical composition. Chemical homogeneity-heterogeneity (H) has been quantified using the (weighted) sum of the standard deviations for each oxide detected (see Dungworth 2007 for further details). Taps slags are relatively homogeneous and yield H values close to 1 while non-tapped slags and smithing slags give higher values (the latter with H values up to 10).

Results: visual examination

The industrial debris from Crosfields School comprises just over 6kg of metalworking debris (Table 2). Much of the material is obscured by iron concretions that have formed after deposition; this makes some identifications rather difficult. Most of the material is categorized as non-diagnostic ironworking slag (NDFe, HE 2015, fig. 18). While this material lacks any distinctive morphology that would allow the identification of the specific production process, it is in most cases quite dense. Many ironworking slags contain abundant porosity and so have relatively low densities; however, smelting slags are often relatively dense. In a few cases the slag is so dense that it can be categorized as dense iron silicate slag (DIS, Starley 1998). A single fragment of tap slag was also recovered (HE 2015, fig. 16).

Table 2. Industrial materials recovered

Cut	*Fill*	*sample*	*Type*	*Wt (g)*
100	150	1	NDFe	9
101	151		DIS	354
101	151		NDFe	1138
101	151		TAP	40
102	152		DIS	148
103	153		NDFe	1643
104	156		NDFe	205
105	155		NDFe	63
110	160		NDFe	67
112	162		DIS	275
113	163		NDFe	1360
114	164		NDFe	114
116	166		DIS	199
116	166	5	NDFe	97
116	166		NDFe	307
120	170		NDFe	193
All				6212

Results: scientific analysis

Two samples of slag were selected for chemical analysis (Table 3) and microstructural examination. Both samples share almost identical chemical compositions and the same range of minerals. It is likely that they both derive from the same ironworking process.

Table 3. Chemical composition of the two samples (weight%, mean and standard deviation) and homogeneity (H)

Sample	Na_2O	MgO	Al_2O_3	SiO_2	P_2O_5	K_2O	CaO	TiO_2	MnO	FeO	H
CSR01	0.12 ±0.08	0.21 ±0.06	1.94 ±0.52	19.0 ±1.8	2.7 ±0.6	0.27 ±0.14	1.09 ±0.22	0.11 ±0.07	0.37 ±0.05	74.0 ±1.5	1.46
CSR02	<0.1	0.23 ±0.13	1.85 ±1.31	17.2 ±2.9	4.4 ±2.2	0.43 ±0.25	1.77 ±0.88	<0.1	0.62 ±0.07	73.1 ±2.6	2.53

Sample 1 comprises a fragment of slag from ditch A slot 113 (163) (Figures 6–9). The microstructure displays many phases familiar from other investigations of early iron smelting slags (cf Morton and Wingrove 1969). The proportions of the phases present show some variation (Fig. 7), suggesting that not all of the slag was completely molten at the same time. The most abundant phases are fayalite (usually mid grey) and wüstite (usually very pale grey or white). The fayalite has a composition close to the ideal Fe_2SiO_4, but with some substitution of Fe by Mg, Ca and Mn (Table 4). The wüstite has a composition very close to the ideal FeO. The slag also contains small amounts of several other phases (minor, additional phases are usually darker than the fayalite, Figs 6 and 7). Hercynite (slightly darker grey than the fayalite) is a common secondary mineral found in early iron smelting slags. The hercynite in this sample has a composition which is relatively rich in iron compared to the ideal $FeAl_2O_4$, and suggests the substitution of some Al^{3+} by Fe^{3+} (placing this spinel close to midway between hercynite and magnetite). Leucite is also present although this appears to contain some iron as well. Two other phases were noted, although their exact identifications are uncertain (Table 4). The first of these is a calcium phosphate, although the Ca:P ratio is higher than that known in commonly occurring calcium phosphates, and iron is also present. The second appears to be an iron potassium phosphorus compound but no mineral of this approximate formula ($3K_2O.2P_2O_5.9FeO$) is known. While small fragments of glassy matrix were present in this sample (Fig. 7), this had undergone microphase separation; a phenomenon usually associated with slow cooling (cf Dungworth and Paynter 2011).

When iron smelting slags have cooled relatively quickly (for example tapped iron smelting slags), they usually contain wüstite and fayalite with a glassy matrix (although some crystallization within this matrix is not uncommon). This sample is notable for the near complete crystallization (or devitrification) within the matrix and the formation of numerous small and rather exotic phases. This suggests that this slag cooled very slowly (or possibly was reheated).

Table 4. Chemical composition of the phases in sample 1 (weight%)

	Na_2O	MgO	Al_2O_3	SiO_2	P_2O_5	SO_3	K_2O	CaO	TiO_2	MnO	FeO
Wüstite	<0.1	0.1	0.6	0.3	0.2	<0.1	<0.1	0.1	0.6	<0.1	97.9
Wüstite	<0.1	<0.1	1.7	4.8	3.3	<0.1	0.2	0.1	0.6	<0.1	88.8
Fayalite	<0.1	<0.1	0.5	25.3	2.0	<0.1	<0.1	0.3	<0.1	0.5	77.0
Fayalite	<0.1	0.2	0.4	24.1	3.8	<0.1	<0.1	0.3	<0.1	0.4	70.4
Hercynite	<0.1	0.1	47.0	0.3	<0.1	<0.1	<0.1	<0.1	0.9	<0.1	51.3
Leucite	2.0	<0.1	20.9	43.4	4.7	0.4	14.7	0.5	0.2	<0.1	12.9
CaPO?	1.0	<0.1	<0.1	0.5	43.6	<0.1	1.6	43.8	<0.1	<0.1	9.2
CaPO?	1.4	0.1	0.1	0.6	43.2	<0.1	1.6	42.3	<0.1	0.1	10.4
CaPO?	1.1	<0.1	<0.1	0.3	44.0	<0.1	1.3	44.3	<0.1	<0.1	8.7
CaPO?	1.0	0.2	<0.1	0.3	44.2	<0.1	1.4	44.0	<0.1	<0.1	8.8
FeKPO?	1.6	<0.1	0.5	0.6	36.3	<0.1	20.2	0.3	<0.1	0.3	39.8
FeKPO?	1.5	<0.1	0.7	0.7	36.3	<0.1	20.6	0.1	<0.1	0.3	39.4
Glassy matrix	1.8	<0.1	21.0	42.1	5.4	0.4	13.6	0.6	0.1	<0.1	14.7

Sample 2 comprises a fragment of slag from ring gully slot 103 (153) (Figs 8–9). The microstructure displays most of the phases and texture seen in sample 1. The dominant phases are wüstite and fayalite with minor amounts of hercynite, as well as a calcium phosphate and an iron potassium phosphate (Table 5). The matrix is again characterized by the formation of numerous small crystalline phases (devitrification).

Table 5. Chemical composition of the phases in sample 2 (weight%)

	Na_2O	MgO	Al_2O_3	SiO_2	P_2O_5	SO_3	K_2O	CaO	TiO_2	MnO	FeO
Fayalite	<0.1	0.3	0.3	26.2	0.7	<0.1	<0.1	0.4	<0.1	0.7	71.2
Hercynite	<0.1	<0.1	47.1	0.2	<0.1	0.1	<0.1	<0.1	0.5	0.2	51.5
Hercynite	0.1	<0.1	46.6	0.5	<0.1	<0.1	<0.1	<0.1	0.4	0.1	51.8
CaPO?	0.6	<0.1	<0.1	0.3	43.7	<0.1	2.1	43.8	<0.1	0.1	9.1
CaPO?	0.7	0.2	<0.1	0.3	43.9	<0.1	1.8	43.6	<0.1	0.2	9.2
CaPO?	0.7	<0.1	<0.1	0.2	44.4	<0.1	1.7	43.8	<0.1	<0.1	8.9
FePO?	0.8	0.2	<0.1	2.0	35.4	<0.1	6.8	6.5	<0.1	0.9	46.6
FePO?	0.6	<0.1	<0.1	2.1	35.5	<0.1	7.1	6.9	<0.1	1.1	46.1
FePO?	0.7	<0.1	<0.1	2.4	35.3	<0.1	7.3	6.4	<0.1	1.0	46.2

Summary

The 6kg of slag recovered from Crosfields School contains a high proportion of non-diagnostic ironworking slag. Most of this slag lacks a distinctive morphology which would allow the definite identification of the process which produced it. The only diagnostic ironworking slags present were ones produced by bloomery iron smelting. In some cases, these dense iron silicate slags were identified by their relatively high density. It is notable that most of the non-diagnostic ironworking slags also shared a relatively high density. It is likely that the slag assemblage was produced by a smelting using a non-tapping furnace (despite the single fragment of tap slag). The assemblage is relatively small and probably represents less than all of the slag produced by a single smelt. The absence of any vitrified ceramic lining suggests that the furnaces were sited some distance away (ceramic furnace lining is much more friable than smelting slag).

The two samples of analysed slag from Crosfields School share almost the same microstructure and chemical composition — both almost certainly derive from the same process. The chemical composition (in particular the manganese) suggests that these are bloomery iron smelting slags (rather than smithing slags). The analysed samples are moderately heterogeneous with H values typical for non-tapped iron smelting slags (cf Dungworth 2007). The microstructure suggests that the samples initially cooled fairly quickly but this was followed by a period of much slower cooling (or possibly a period of reheating) which gave rise to the near complete devitrification of the glassy matrix. Such microstructures are usually only found in non-tapped iron smelting slags.

Table 6. Comparable smelting sites in the Thames valley

Site	*Location*	*Reference*
Arborfield Garrison	SU 763 652	Hammond 2011; Pine 2003
Brooklands	TQ 069 632	Hanworth and Tomalin 1977
Finchampstead	SU 798 632	Platt 2013
Heckfield	SU 720 600	Dungworth 2007; NEHAHS 2018,
Lightwater	SU 920 630	*Britannia* 17, 424; Sarah Paynter *pers comm*
Matthews Green Farm	SU 805 700	Ford 2017
Riseley Farm	SU 734 638	Lobb and Morris 1991–3; McDonnell 1984
Sindlesham	SU 771 700 SU 781 694	Lewis *et al* 2013; McNicholl-Norbury and Ford 2013
Three Mile Cross	SU 713 677	Ford *et al* 2013
Benner Lane, Woking	SU 950 610	Dungworth unpublished
Thorpe Lea Nurseries	TQ 017 697	Starley 1998

The chemical composition of the two samples of Crosfields School slag are similar to each other and are broadly similar to other analysed slags from this region, especially when compared with contemporary iron smelting slags from other parts of England (Figs 12–14). The bloomery iron smelting slags from the lower-middle Thames Valley (Fig. 12) form a distinct compositional group (Figs 13 and 14). The iron smelting slags of this region contain low levels of magnesium, calcium and manganese but are rich in phosphorus. As already noted (*eg* Paynter 2006; Allen in Lewis *et al.* 2013), the high phosphorus content of these slags suggests that the ore source was rich in phosphorus. The most likely ore seems to be a bog iron ore. Before the improvements made in the medieval and modern periods to the navigation of the Thames (and some of its tributaries), as well as more intense agricultural land drainage, it is likely that much more of the low-lying land in the Thames valley was subject to flooding and waterlogging. Such ground conditions would encourage the solution of iron in some locations and its redeposition in others, leading to bog iron ore deposits.

The behaviour of phosphorus during bloomery smelting, in particular the extent to which it partitions into the metal or the slag, will depend on the exact smelting conditions. It is likely that the metal produced at Crosfields School (and other sites in this region) was relatively rich in phosphorus (*c.* 1% by weight). Such phosphoric iron would be harder than plain iron and would be better able to hold a sharp edge. Phosphoric iron would tend to be rather brittle at high temperatures and it would have required skilful forging to prevent fractures (Vega *et al.* 2003). Whatever the strengths and weaknesses of phosphoric iron, it was widely used in southern Britain in the Iron Age. Ehrenreich (1985) found that just over 38% of the Iron Age ferrous artefacts investigated were made of phosphoric iron (35% were steels and just 26% were plain iron).

Radiocarbon Dating

Four samples from the site were submitted to the Chrono radiocarbon dating laboratory at the Queen's University of Belfast. The QUB results were calibrated using Calib rev 7.0 with data from INTCAL 13 (Reimer *et al*. 2013). Details of methodology are in the archive: in summary, the laboratory reported that the samples were reliable, and the results are given in Table 7, at 2-sigma range The most probable date in each case is highlighted in **bold**.

Table 7: Radiocarbon dating

Lab ID	*Context*	*Material*	*Radiocarbon Age (BP)*	*Calibrated Age (BC)*	*Probability*
UBA-38810	Ring gully slot 102 (152, s3)	Charcoal	2175 ± 30 BP	**360-163**	**99.4%**
				127-122	0.06%
UBA-38811	Ditch A slot 113, 163) s4	Charcoal	2185 ± 27 BP	**359-271**	**58.6%**
				263-175	**41.4%**
UBA-38812	Pit 119 (169) s7	Charcoal	2442 ± 29 BP	751-682	25.5%
				668-635	9.6%
				627-613	1.7%
				592-409	**63.1%**
UBA-38813	Posthole 130 190 s12	Charcoal	2730 ± 29 BP	**926-814**	**100%**

Conclusion

This small excavation has investigated prehistoric settlement dating to the Late Bronze Age, Early and Middle Iron Age with evidence for Roman activity in the form of land division.

The earliest component of the site is represented by a small cluster of Late Bronze Age shallow pits and postholes and which includes a small roundhouse. It was considered that this cluster was homogenous and single phase but the two associated radiocarbon dates are several centuries apart and suggest that there were two phases of activity at this time. The later date from pit 119 of 592-409 cal BC is associated with a finger tip decorated carinated bowl, and together suggest a reliable date. The earlier date 926-814 cal BC comes from the roundhouse with no direct association with other datable artefacts, and with pottery from other roundhouse postholes being poorly diagnostic, there is a possibility that this charcoal is residual, though it is uncanny how much 'residual' or 'intrusive' charcoal finds its way into features despite an absence of any other contemporary activity nearby, and then even ends up being selected for dating. It is considered therefore that the date can be taken at face value and that the roundhouse and many of the other nearby features do represent a Late Bronze Age settlement. The cluster is unenclosed with no evidence for more elaborate infrastructure such as 4-poster buildings or fences. The small number of features and paucity of artefacts might be taken to indicate that this is a relatively short-lived settlement.

The significance of the single Early Iron Age pit is unclear other than it post-dates the Late Bronze Age cluster by several centuries and its location here seems to be a coincidence, perhaps reflecting the attractiveness of this plateau in all periods.

The simple Middle Iron Age ring gully structure is radiocarbon dated to 360–163 cal BC. Although there is a possibility of further contemporary occupation to the south beyond the excavated area, this small site adds to the corpus of other broadly contemporary sites in the region which reflects small or perhaps short-lived sites that are now recorded. Comparable sites, to name a few, are to be found at Staff College, Bracknell (Lowe 2013) or Matthewsgreen, Wokingham (Ford 2017b). In common with many of these other sites, economic data are absent or poor. Although the animal husbandry component cannot be addressed due to poor (or no) bone preservation on the acidic soils, the paucity of both botanical remains and facilities for large scale grain storage, is a recurrent pattern in contrast to chalkland or Thames gravel sites. It is suggested that these small tertiary geology sites reflect small scale mostly pastoral production.

An alternative economic model for Crosfields School and some of the comparable sites is that they are primarily intended for iron production. Ethnographic studies of iron production note that this takes place away from main areas of settlement due to the fire risk and the seemingly small size of the sites here may simply reflect a fire break with a parent settlement. Yet the volume of iron produced represented by the small amount of slag recovered is quite modest, and seems less likely to reflect a specialized site than an added activity for home consumption on a simple (short-lived) farming site. This would correspond with Condron's type D production sites- production in a domestic setting (cf Condron 1997). Nevertheless the recurrence of Iron Age sites with iron production in this region does seem to suggest the presence of an 'industry' (Fig. 12).

Finally, the discovery of a couple of Roman ditches would not normally evoke particular interest. However, the features here take on added significance in the context of the prediction that the plateau edge in south Reading is a zone of preferred settlement both in later prehistory as well as in Roman times (Ford 2017a). The ditches here and stray finds presumably from manuring of farmland, must surely indicate a contemporary occupation site in relative proximity to the excavations here.

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References

BGS, 2000, *British Geological Survey*, 1:50000, Sheet **268**, Solid and Drift Edition, Keyworth

Carlsson, C, 2010, 'An archaeological excavation at 29 Cressingham Road, Reading', John Moore Heritage Services, unpubl rep **RDCR10**, Beckley

Condron, F, 1997, 'Iron production in Leicestershire, Rutland and Northamptonshire in Antiquity', *Trans Leicestershire Archaeol Hist Soc* **71**, 1–20

Dungworth, D, 2007, 'Heckfield, Hampshire: an examination of middle Iron Age smelting slags', English Heritage Research Department Report **104/2007**, London

Dungworth, D, 2011, 'The metalworking debris', in J A Nowakowski and H Quninnell, *Trevelgue Head, Cornwall: the importance of C K Croft Andrew's 1939 excavations for prehistoric and Roman Cornwall*, Cornwall County Council, Truro, 220–44

Dungworth, D, 2014, 'Who's afraid of the bowl furnace?' *Historical Metallurgy,* **48**, 1–7

Dungworth, D and Mepham, L, 2012, 'Prehistoric iron smelting in London: evidence from Shooters Hill', *Historical Metallurgy,* **46**, 1–8

Dungworth, D and Paynter, S 2011 'Nano-scale investigation of some dichroic/opalescent archaeological materials', *in* I Turbanti-Memmi (ed), *Proceedings of the 37th International Symposium on Archaeometry*. Berlin: Springer-Verlag, 371–5

Ehrenreich, R, 1985, *Trade, Technology and the Ironworking Community in Iron Age of Southern Britain,* BAR (Brit Ser) **144**, Oxford

Entwistle, R, Taylor, K and Ford, S, 2003, 'The Wood Lane Site: excavation of middle Iron Age and early Roman enclosures and field systems, an early/middle Bronze Age cremation cemetery, and Neolithic and middle Bronze Age deposits', in S Ford, R Entwistle and K Taylor *Excavations at Cippenham, Slough, 1995–7*, TVAS Monogr **3**, Reading, 36–94

Ford, S, Pine, J, Weale, A, 2013, 'Middle Iron Age Occupation and Iron Production and a Late Saxon Hearth at Grazeley Road, Three Mile Cross, Reading, Berkshire' in S Preston (ed) *Iron Age Iron Production Sites in Berkshire, Excavations 2003-2012*, TVAS Monogr **16**, Reading, 37-59

Ford, S and Raymond, F, 2013, 'A Late Bronze Age Artefact Scatter and Medieval Ditch on St Peter's Hill, Caversham', *Berkshire Archaeol J*, **81**, 27–35

Ford, S 2017a, 'A Late Bronze Age burnt mound, Bronze Age occupation and Roman enclosure at Ridgeway School, Whitley, Reading', in T Dawson, S Ford and A Taylor, *Archaeological Excavations on Bronze Age, Iron Age, Roman and Medieval Sites in Reading and Wokingham, Berkshire*, TVAS Occas Pap **21**, Reading, 1–33

Ford, S, 2017b, 'An Iron Age farm, Roman settlement and Medieval charcoal clamps at Matthews Green Farm, Twyford Road, Wokingham, Berkshire', in S Ford, A Taylor and T Dawson, *Archaeological Investigations in Reading: Bronze Age, Iron Age and Roman*, TVAS Occas Pap **19**, Reading, 35–57

Ford, S 2018a, 'Bronze Age occupation at 74 Northcourt Avenue, Reading, Berkshire, Thames Valley Archaeological Services unpubl rep **17/123b,** Reading

Ford, S, 2018b, 'Land at Crosfields School, Shinfield Road, Reading, Berkshire, an archaeological evaluation', Thames Valley Archaeological Services, unpubl rep **18/83**, Reading

Hammond, S, 2011, 'An Iron Age iron smelting site at Baird Road, Arborfield Garrison, Berkshire, 2002' in S Preston (ed), *Archaeological Investigations in the Silchester Hinterland: Exploring landscape use around the Roman town*, TVAS Monogr **9**, Reading, 33–42

Hanworth, R and Tomalin, D J, 1977, *Brooklands, Weybridge: The Excavation of an Iron Age and Medieval Site 1964-5 and 1970-71*, Res Vol Surrey Archaeol Soc **4**, Guildford

Hardy, A and Cropper, C, 1999, *Excavations at Larkwhistle Farm, Brimpton, Berkshire*, Oxford Archaeol Unit Occas Pap **2**, Oxford

HE, 2015, *Archaeometallurgy,* Centre for Archaeology Guidelines, Historic England, Portsmouth

HE, 2016, *A standard for pottery studies in archaeology*, Historic England, PCRG, SGRP, MPRG

Lewis, J, Crabb, S and Ford, S, 2013 'Bronze Age urns, Iron Age iron smelting and Saxon charcoal production at Sadler's End, Sindlesham, Wokingham, Berkshire', *in* S Preston (ed) *Iron Age Iron Production Sites in Berkshire: Excavations 2003–2012*, TVAS Monogr **16**, Reading, 1–34

Lobb, S J, and Morris, E L, 1993, 'Investigations of Bronze Age and Iron Age features at Riseley Farm, Swallowfield', *Berkshire Archaeol J* **74** (for 1991-93) 37-68

Lowe, J, 2013, *Middle Bronze Age and Middle Iron Age Occupation and Post-medieval Lime Kilns at RAF Staff College, Broad Lane, Bracknell, Berkshire,* TVAS Occas Pap **3**, Reading

McDonnell, J G, 1984, *Interim report. Slags, Riseley Farm, Berkshire,* English Heritage AML Rep **4422**, London

McNicoll-Norbury, J and Ford, S 2013 *Middle Iron Age, Late Iron Age and Roman occupation at Hatch Farm, Winnersh, Reading, Berkshire*, TVAS Occas Pap 25, Reading

Morton, G R and Wingrove, J, 1969, 'Constitution of bloomery slags: Part I - Roman'. *J Iron and Steel Inst* **207**, 1556–64

Milbank, D, 2010, 'Late Iron Age/early Roman and late Roman occupation at 68–72 Northcourt Avenue, Reading', in S Preston (ed), *Archaeological Investigations to the South of Reading, 2002-2008: Exploring Late Iron Age and Roman settlement south of Reading, Berkshire*, TVAS Monogr **13**, Reading, 21–37

NEHHAS 2018, *Excavations at the site of The Grove and at a nearby Iron Age working site, Heckfield, Hampshire 1990-2003,* North East Hampshire Historical and Archaeological Society Journal **8**, Fleet

NPPF, 2012, *National Planning Policy Framework,* Dept Communities and Local Govt, London

Paynter, S, 2006, 'Regional variations in bloomery smelting slag of the Iron Age and Romano-British Periods'. *Archaeometry,* **48**, 271–292

Pine, J, 2003, 'The excavation of a late Iron Age/Roman settlement and iron production site at the Whitehall Brick and Tile Works, Arborfield Garrison, Berkshire'. *Berkshire Archaeol J* **76**, 37–67

Platt, D, 2013, 'A Middle Iron Age iron production site at Manor Farm, Lower Sandhurst Road, Finchampstead, Berkshire', in S Preston (ed) *Iron Age Iron Production Sites in Berkshire: Excavations 2003–2012,* TVAS Monogr **16**, Reading, 100–13

PCRG, 1997, *The study of later prehistoric pottery: general policies and guidelines for publication*, Prehistoric Ceramics Res Grp, Occas Pap 1 and 2 (revised)

Preston, S and Taylor, A, 2018, *An Early to Middle Iron Age settlement at the Former Elvian School, Reading, Berkshire*, TVAS Occas Pap **27**, Reading

Preston, S (ed), 2003, *Prehistoric, Roman and Saxon Sites in Eastern Berkshire: Excavations 1989–97*, TVAS Monogr 2, Reading

Reimer, P J, Bard, E, Bayliss, A, Beck, J W, Blackwell, P G, Bronk Ramsey, C, Buck, C E, Cheng, H, Edwards, R L, Friedrich, M, Grootes, P M, Guilderson, T P, Haflidason, H, Hajdas, I, Hatté, C, Heaton, T J, Hogg, A G, Hughen, K A, Kaiser, K F, Kromer, B, Manning, S W, Niu, M, Reimer, R W, Richards, D A, Scott, E M, Southon, J R, Turney, C S M and van der Plicht, J, 2013, 'IntCal13 and MARINE13 radiocarbon age calibration curves 0–50000 years cal BP', *Radiocarbon,* **55(4)**, 1869–87

Simmonds, A, Cook, S, Biddulph, E and Score, D, 2009, *Archaeology in the Park: Excavations at Jennett's Park, Bracknell, Berkshire*, Oxford Archaeol Occas Pap **18**, Oxford

Tomber, R, and Dore, J, 1998, *A national Roman fabric reference collection: a handbook*, Mus of London Archaeol Service/English Heritage/British Museum

Vander Voort, G F, 1999, *Metallography: Principles and Practice*, Materials Park, Ohio

Vega, E, Dillmann, P, L'Hertier, M, Fluzin, P, Crew, P and Benoit, P, 2003, 'Forging of phosphoric iron. An analytical and experimental approach', in *Archaeometallurgy in Europe International Conference: 24-25-26 September 2003, Milan, Italy*, Associazione Italiana di Metallurgia, Milano, 337–46

APPENDIX 1: Catalogue of Excavated Features

Cut	*Fill*	*Group*	*Type*	*Date*
1	50	RG1	Ring Gully	MIA
2	51	A	Ditch	MIA
3	52	C	Gully	Roman
4	53		Posthole	
5	54		Posthole?	
100	150	RG1	Ring Gully	MIA
101	151	RG1	Ring Gully	MIA
102	152	RG1	Ring Gully	MIA, C14
103	153	RG1	Ring Gully	MIA
104	154	RG1	Ring Gully	MIA
105	155	RG1	Ring Gully	MIA
106	156	RG1	Ring Gully	MIA
107	157	RG1	Ring Gully	MIA
108	158	RG1	Ring Gully	MIA
109	159	RG1	Ring Gully	MIA
110	160	RG1	Ring Gully	MIA
111	161		Posthole	MIA
112	162	A	Ditch cutting pit	MIA
113	163	A	Ditch	MIA, C14
114	164	A	ditch	MIA
115	165		Posthole	MIA?
116	166		Pit	MIA
117	167	A	Ditch	MIA
118	168		Pit	EIA
119	169		Pit	EIA C14
120	170		Posthole	
121	171		Posthole	EIA
122	172		Posthole	EIA
123	173		Posthole	
124	174		Posthole	
125	175		Posthole	EIA
126	176	RH1	Posthole	EIA
127	177	RH1	Posthole	
128	178	RH1	Posthole	
129	179	RH1	Posthole	
130	180	RH1	Posthole	LBA C14
131	181		Pit/Posthole	EIA
132	182	RH1	Posthole	
133	183	RH1	Posthole	EIA
134	184		Posthole	
135	185	B	Ditch slot	Roman
136	186	B	Ditch slot	Roman
137	187	B	Ditch slot	Roman
138	188	C	Gully Slot	Roman
139	189	C	Gully	Roman
140	190	C	Gully	Roman
141	191		Small posthole or stake	
142	192	D	Gully	MIA
143	193	D	Gully Slot	MIA
144	194	D	Gully Slot	MIA
145	195	D	Gully Slot	MIA
146	196	B	Gully Slot	Roman
147	197	B	Ditch	Roman
148	198	A	Ditch	MIA
149	199		Silt Stripe	
200	250		Silt Stripe	
201	251	B	Ditch	Roman
202	252	C	Ditch	Roman

APPENDIX 2*:* Catalogue of Pottery

Cut	*Fill*	*Feature*	*Fabrics*									*TOTAL Number*	*TOTAL Wt (g)*
			FL	**SAFE**	**SAOR**	**SAFL**	**SA**	**Other**	**ALHRE**	**OXFRS**	**Roman**		
1	*50*	*Ring gully*	*6*				*8*					*14*	*35*
101	151	ring gully	10	98	11	-	-	-	-	-	-	122	485
103	153	ring gully	1	-	14	-	-	-	-	-	-	15	60
104	154	ring gully	-	1	1	-	-	-	-	-	-	2	22
105	155	ring gully	-	2	-	2	-	-	-	-	-	4	12
106	156	ring gully	-	-	-	10	-	-	-	-	-	10	11
109	159	ring gully	-	2	2	-	-	-	-	-	-	4	6
111	161	posthole	-	-	-	-	58	-	-	-	-	58	102
112	162	ditch/pit	1	3	-	-	4	-	-	-	-	8	62
113	163	ditch	-	-	1	-	2	1	-	-	-	4	11.5
114	164	ditch	-	1	-	2	1	-	-	-	-	4	42
116	166	pit	2	2	1	4	13	-	1	-	-	23	149
118	168	pit	6	-	4	-	-	-	-	-	-	10	41
119	169	pit	-	3	-	-	-	-	-	-	-	3	87.5
121	171	posthole	-	1	-	-	-	-	-	-	-	1	1
122	172	posthole	3	-	-	-	-	-	-	-	-	3	1
125	175	posthole	1	-	-	-	-	-	-	-	-	1	20
126	176	posthole	1	-	-	-	-	-	-	-	-	1	8
131	181	pit/phole	-	1	-	-	-	-	-	-	-	1	7
133	183	posthole	1	-	-	-	-	-	-	-	-	1	5
135	185	ditch	-	-	-	1	1	-	-	-	-	2	11
136	186	ditch	-	-	-	-	-	-	3	1	-	4	42
137	187	ditch	-	-	1	-	-	-	-	-	-	1	1
142	192	Gully D	1	-	2	2	-	-	-	-	-	5	75
146	196	Ditch	-	-	-	-	-	-	-	1	-	1	2
202	252	gully	-	-	-	-	-	-	-	-	1	1	19
FS1	us		-	-	25	-	-	-	-	-	-	25	116
FS3	us		-	-	-	-	-	-	-	-	1	1	3
FS4	us		-	-	-	-	-	-	1	-	-	1	19
FS5	us		-	-	-	-	-	-	-	-	2	2	21
FS6	us		-	-	-	-	4	-	-	-	1	1	13
FS7	us		-	-	-	-	4	-	-	-	-	4	4
FS10	us		-	-	-	-	-	-	1	-	-	1	20
Total			**33**	**114**	**62**	**21**	**95**	**1**	**6**	**2**	**5**	**338**	**1514**

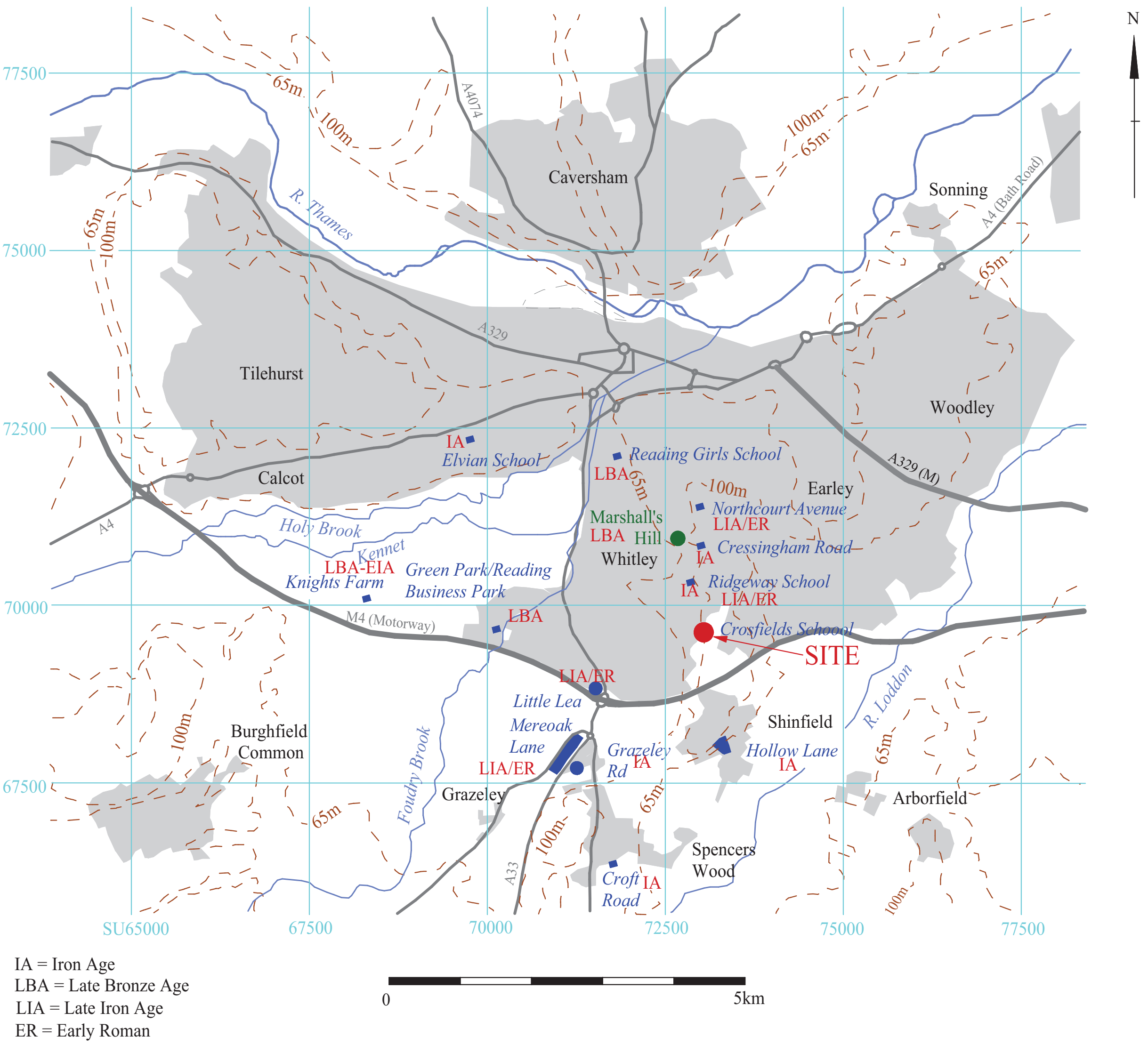


Figure 1. Location of site within Reading, and other local sites mentioned in the text.

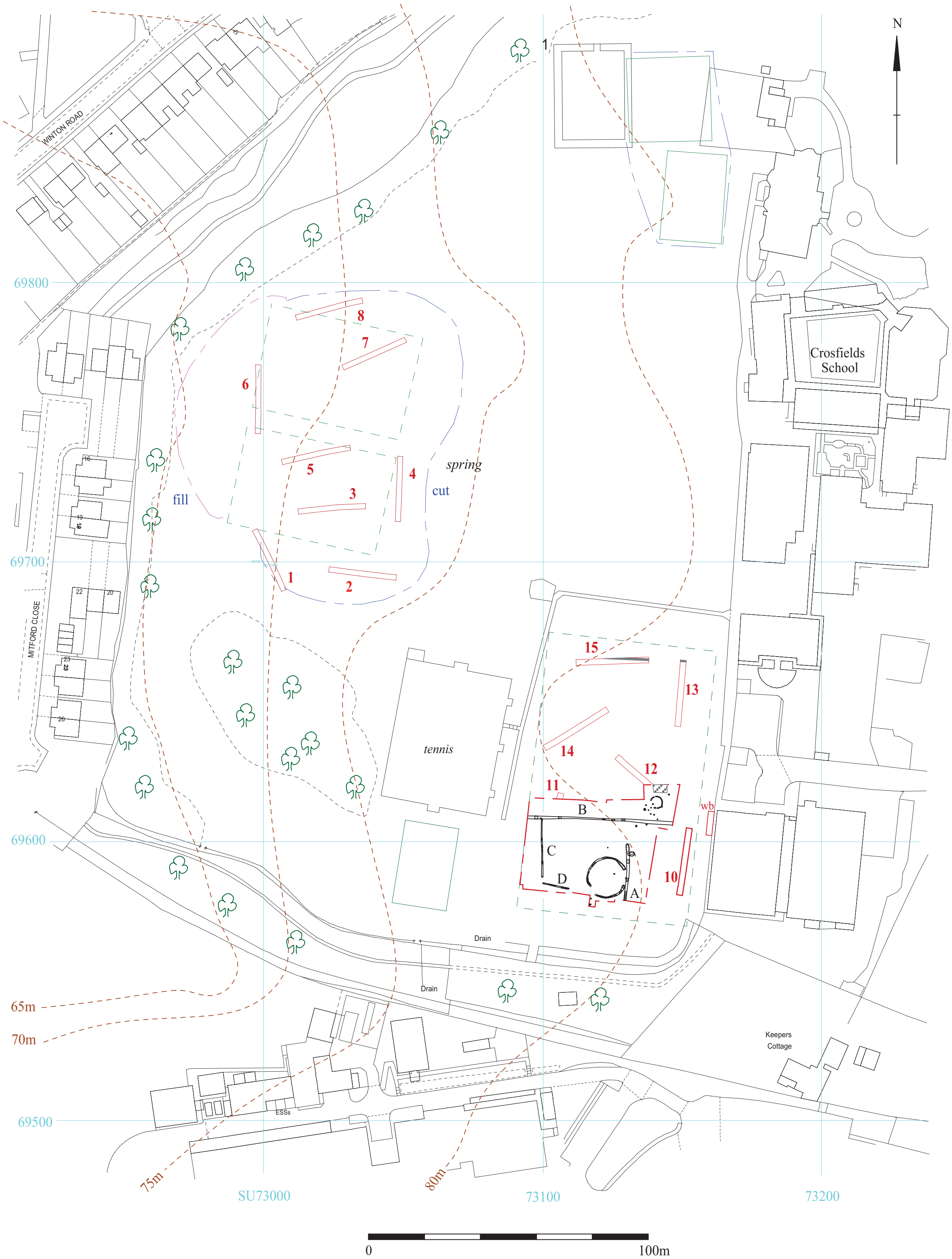


Figure 2. Location of excavation area within the overall development site, also showing evaluation trenches and watching brief area (WB).

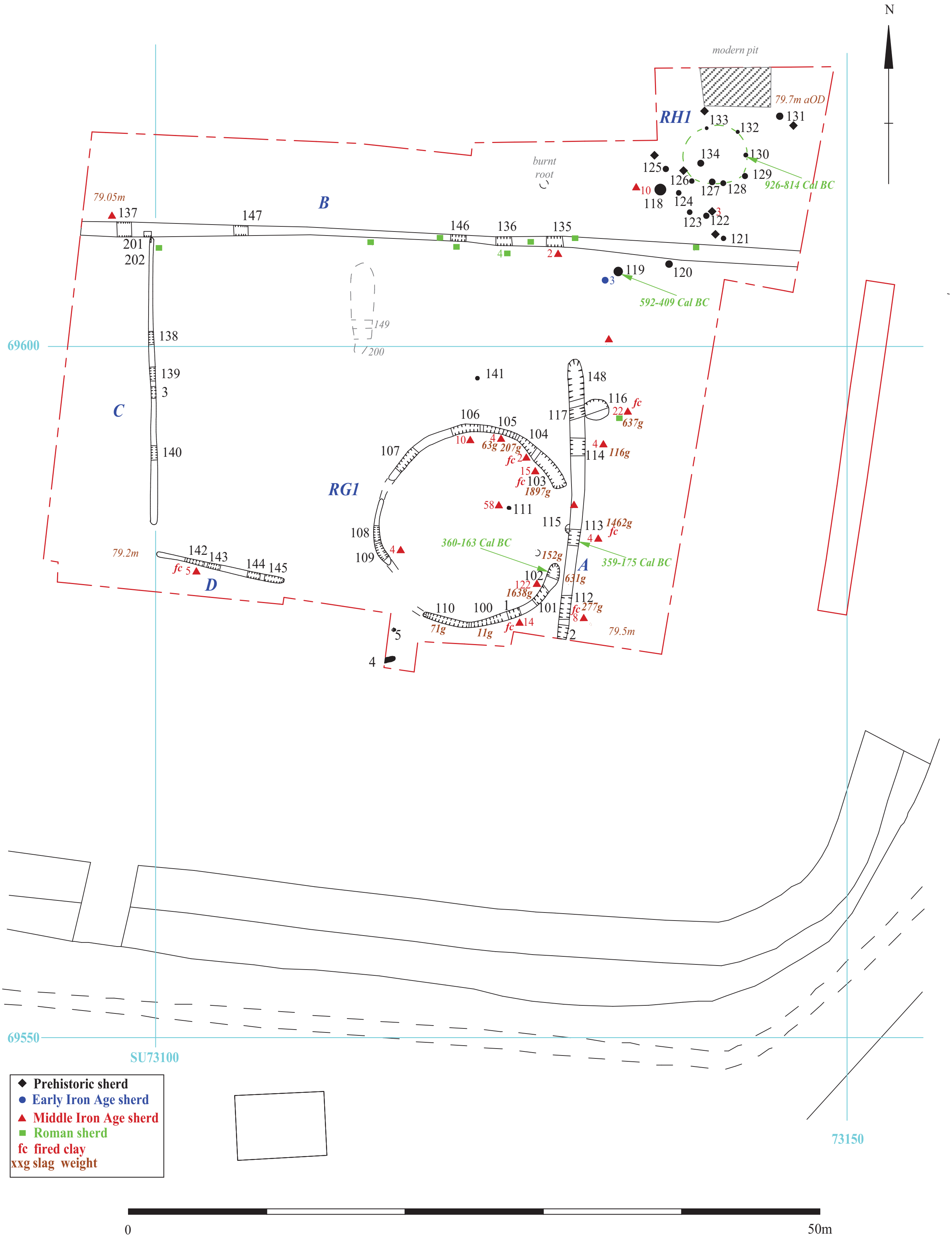


Figure 3. Detailed site plan showing finds distributions

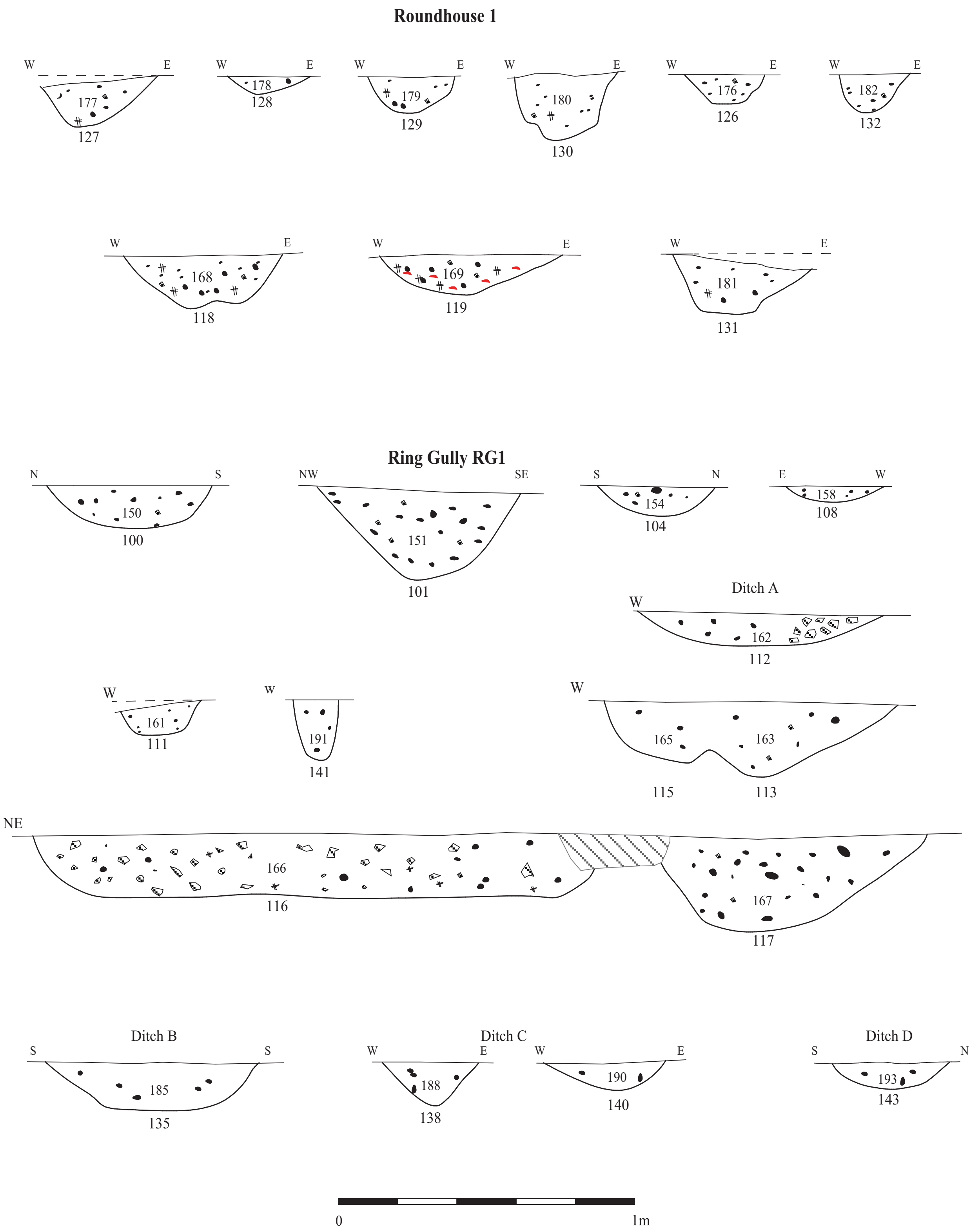
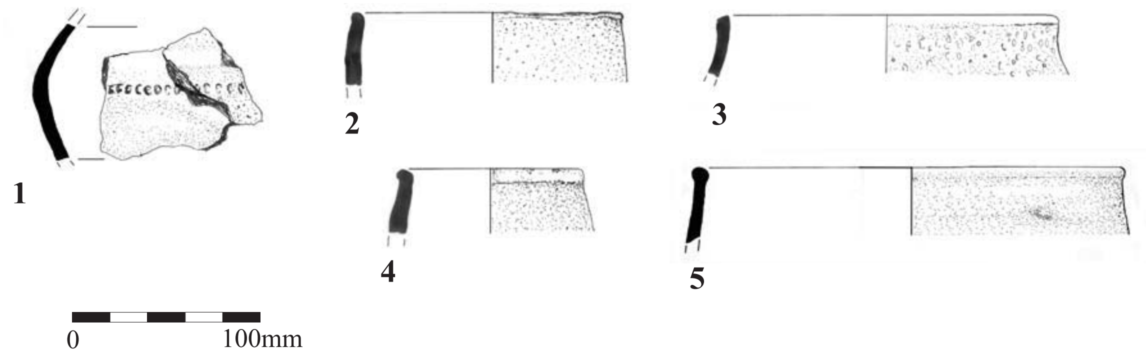


Figure 4. Feature sections



THAMES VALLEY
ARCHAEOLOGICAL
SERVICES

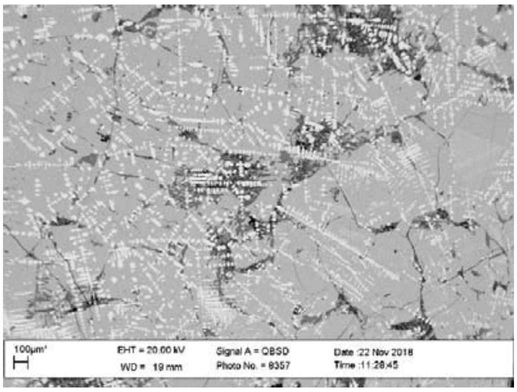


Figure 6 SEM image of sample 1 showing wüstite dendrites and blebs (very pale grey) and equiaxed fayalite (mid grey)

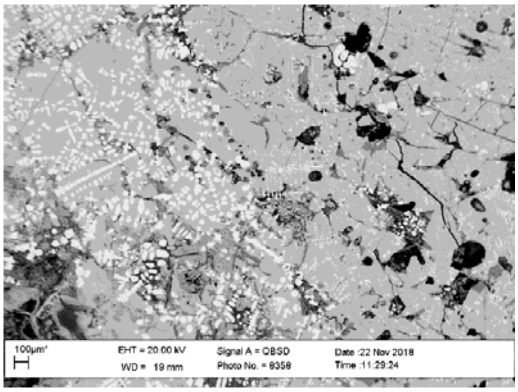


Figure 7 SEM image of sample 1 showing variations in the proportion of wüstite present

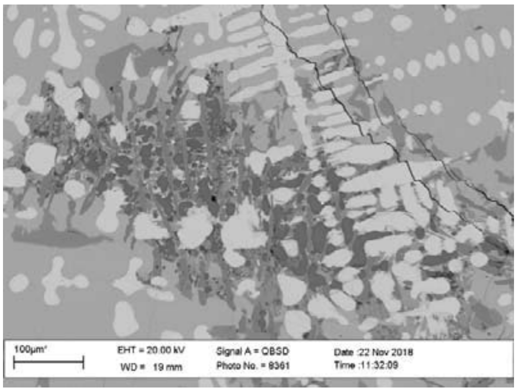


Figure 8 SEM image of sample 1 showing wüstite blebs (very pale grey), fayalite (mid grey) and a complex, multi-phase, devitrified matrix

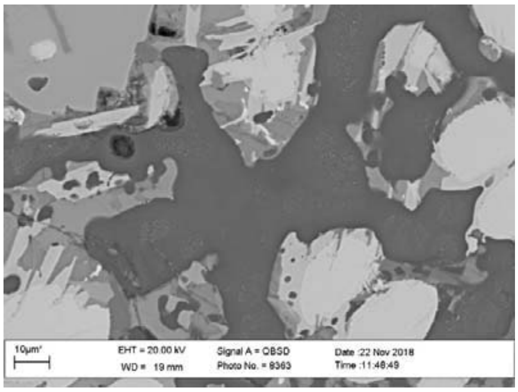


Figure 9 SEM image of sample 1 showing devitrified matrix and micro-phase separated glass

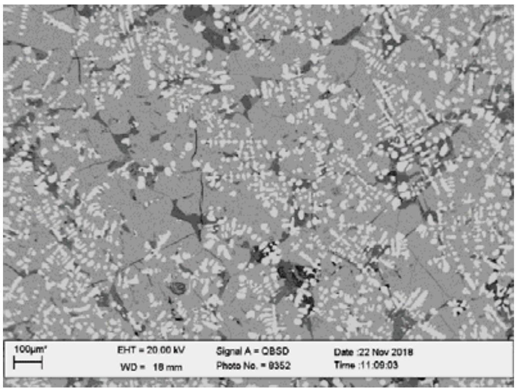


Figure10 SEM image of sample 2 showing wüstite dendrites and blebs (very pale grey), equiaxed to lath fayalite (mid grey) with hercynite and other phases

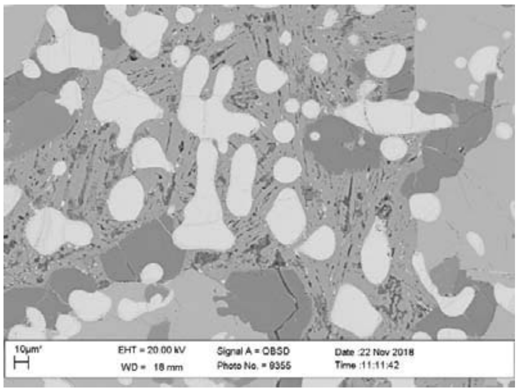


Figure 11 SEM image of sample 2 showing wüstite dendrites and blebs (very pale grey), fayalite (mid grey) hercynite, and a complex, multi-phase, devitrified matrix

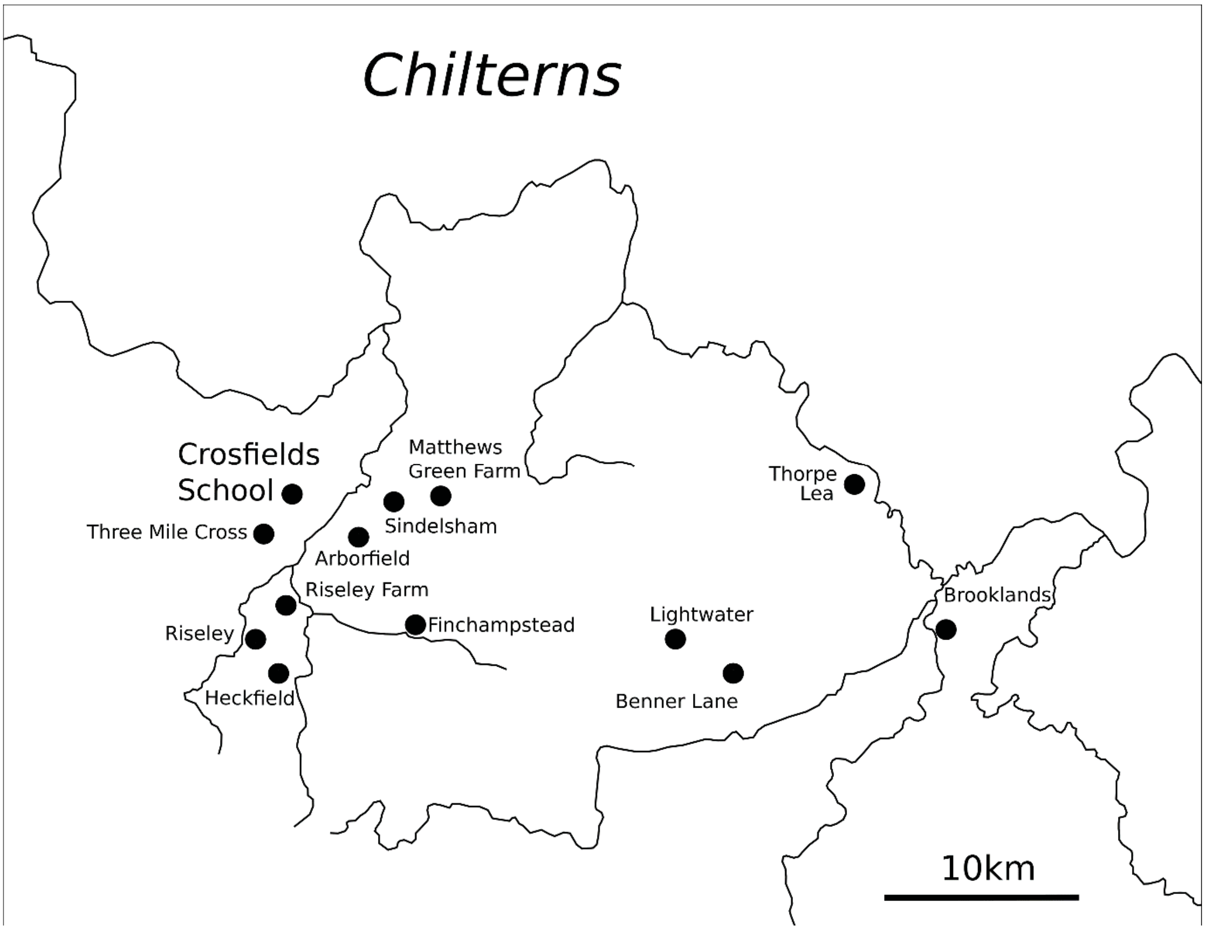


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Figure 12. Distribution of prehistoric iron production sites in the Thames Valley.

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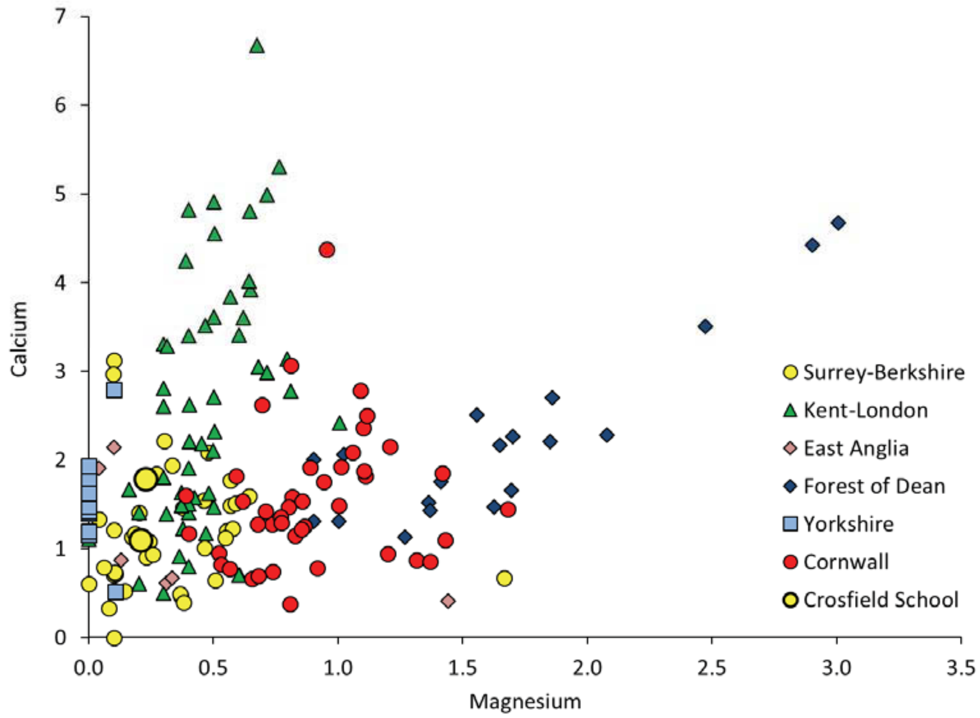

Figure 13. Plot of magnesium and calcium content of Crosfields School slags compared with other slags from the region (as well as other regions)

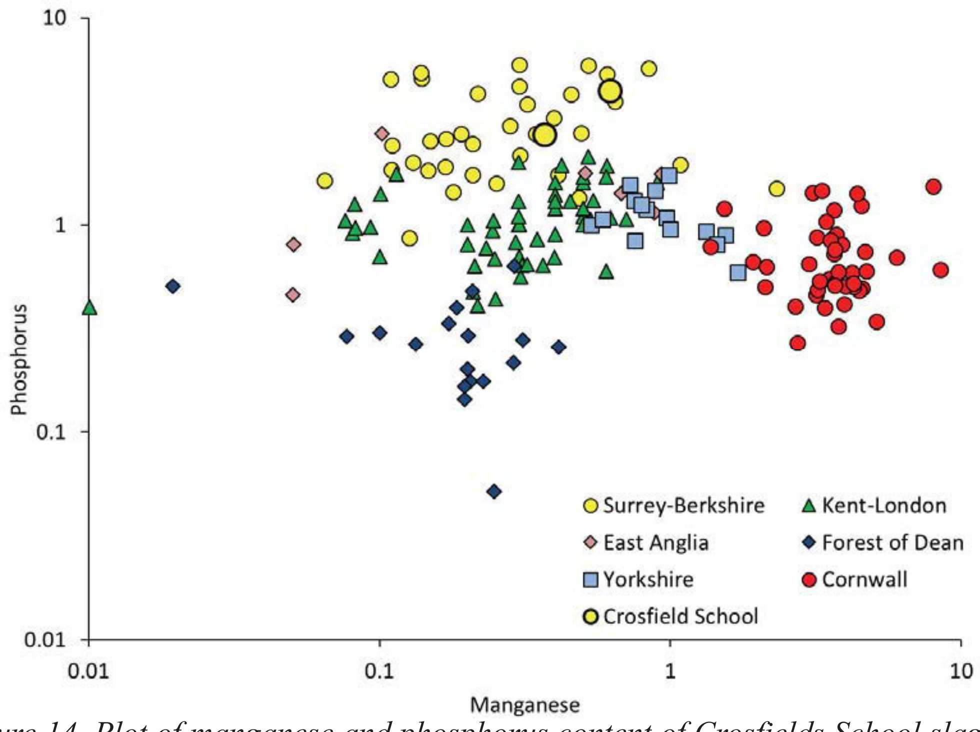

Figure 14. Plot of manganese and phosphorus content of Crosfields School slags compared with other slags from the region (as well as other regions)

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Figures 13 and 14. Comparisons of slags.

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Plate 1. General view of site during excavation, looking south

Plate 2. Aerial view of ring gully; west to top.

Plate 3. Ring gully terminal slot 102 looking south, Scales: 1m and 0.3m.

Plate 4. Ditch A slot 112 nearing ring gully entrance, looking north, Scales: 2m, 1m and 0.1m.

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Plates 1 - 4.

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TIME CHART

Period	Calendar Years
Modern	AD 1901
Victorian	AD 1837
Post Medieval	AD 1500
Medieval	AD 1066
Saxon	AD 410
Roman	AD 43
	AD 0 BC
Iron Age	750 BC
Bronze Age: Late	1300 BC
Bronze Age: Middle	1700 BC
Bronze Age: Early	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC

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