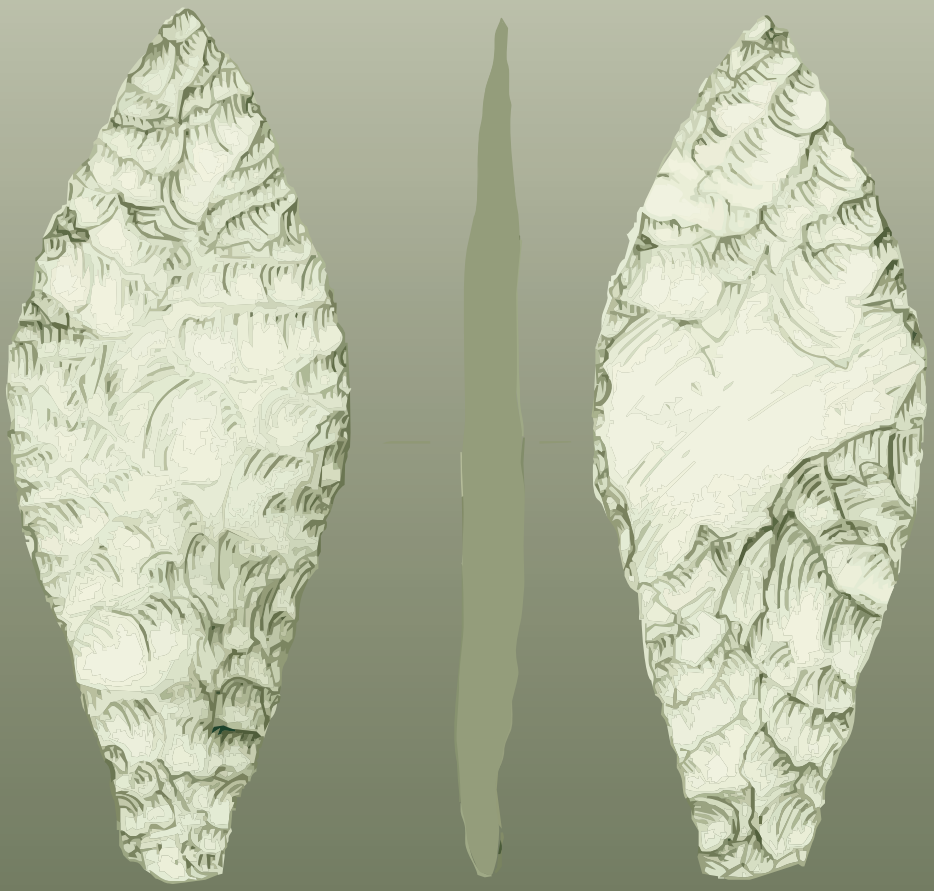
Landscape Evolution in the Middle Thames Valley
Heathrow Terminal 5 Excavations Volume 2

The Flint

(Section 4)



by Kate Cramp and Matt Leivers

SECTION 4

THE FLINT

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Introduction

A total of 10,560 struck flints and 108, 689 pieces (636.287 kg) of burnt unworked flint have been recovered in the course of excavations at Heathrow T5 (**Table 1**; see illustrations in **Fig. 1**). The largest quantities of flint were recovered during excavations at the main Terminal 5 site (PSH 02), which produced a total of 6,398 struck flints and over 51,000 pieces (28.7 kg) of burnt unworked flint. Substantial assemblages also came from the Perry Oaks Drying Beds (WPR 98) and Concourse C (TEC 05) (for plan see print vol. Fig. 1.2).

Table 1. Summary of the flint assemblage by site from Terminal 5, Heathrow.

		Struck flint		Burnt unworked flint	
Site code:	Site name:	Number:	Weight (g)	Number:	Weight (g)
POK 96	Perry Oaks Sludge Works	824	5814	6072	21472
WPR 98	Perry Oaks Drying Beds	2126	17023	30836	203972
GAI 99	Northern Taxiway	204	2876	339	3687
GAA 00	Grass Area 21	27	249	184	1611
PSH 02	Terminal 5	6398	71549	51028	287056
LFA 05	Longford Flood Alleviation	73	374	3422	13271
TEC 05	Concourse C	908	5616	16808	105218
All sites total:		10560	103501	108689	636287

The Heathrow T5 assemblage comes from a small part of an extensive and rich multi-period prehistoric landscape. Major assemblages of Lower and Middle Palaeolithic material have been recovered from gravel pits north of the airport between Yiewsley and Dawley (Collins 1978); very rare Upper Palaeolithic material has been recovered from the airport World Cargo Site (Lewis forthcoming); late Upper Palaeolithic and Early Mesolithic material occurs in small quantities, mostly as stray finds; Later

Mesolithic materials are only slightly more common. Major assemblages again occur in the Early Neolithic (for instance at Staines: Robertson-Mackay 1987) and from this point on the intensive human activity in the middle Thames and its tributaries, both in the valley and on the terraces, is well-represented by lithic material.

Against this background, the Heathrow T5 assemblage seems rather scant in several respects. A small number of redeposited Palaeolithic pieces were recovered including a worn handaxe (**ILL. 1**), a Levallois flake (**ILL. 2**) and an end scraper (**ILL. 3**). Mesolithic activity is represented by a general but low-density spread of residual finds, including three microliths (e.g. **ILL. 4**), two microburins and one burin (**ILL. 5**); with the exception of a group of pits that contained abundant burnt unworked flint on WPR 98 (areas B and C), no potentially *in situ* deposits of flintwork were encountered.

A few assemblages of earlier Neolithic date were recovered from tree-throws, alongside a number of isolated residual finds including two leaf-shaped arrowheads (**ILL. 6 and 7**) and a possible laurel leaf point. Some of the flakes and fragments from polished implements (e.g**. ILL. 8 and 9**) can also be broadly attributed to the Neolithic period. It is from the middle and later Neolithic, however, that large *in situ* assemblages of flintwork start appearing in significant numbers and in a wide range of features, including pits, ditches, waterholes, tree-throws and layers. Following something of a decline in the early part of the period, the volume of flint deposition seems to increase in the middle and later Bronze Age and is marked by the appearance of near-complete knapping deposits in ditches (e.g. that from PSH 02 area 49, pit 535001) along with other 'special' deposits, often associated with waterholes.

A more detailed quantification of the flintwork by area is given in **Table 2**, with a summary of the struck flint assemblage shown in **Table 3**. A catalogue of Illustrated flints can be found in Appendix 2 at the end of this report.

Table 2. Quantification of struck flint and burnt unworked flint by site from Terminal 5, Heathrow.

			Struck flint		Burnt unworked flint	
Site code:	Site name:	Area:	Number:	Weight (g)	Number:	Weight (g)
POK 96	Perry Oaks Sludge Works	POK96	824	5814	6072	21472
POK 96 total:			824	5814	6072	21472
WPR 98	Perry Oaks Drying Beds	Unstratified	223	4216	844	7794
		A2	90	1081	1287	13012
		A3	31	186	522	3688
		A4	10	66	114	1062
		A6	467	1533	778	2969
		A7	84	549	200	1254
		A8	139	939	1589	7736
		B	515	2288	9648	46923
		C1	255	3060	6030	59243
		C2	90	1379	1836	19646
		C3	19	133	159	1171
		C4	58	280	916	4423
		C5	9	168	50	277
		R1	3	15	60	434
		R2	107	951	3301	13173
		R3	16	95	3438	20673
		R4	9	82	6	98
		R5	1	2	58	396
WPR 98 total:			2126	17023	30836	203972
GAI 99	Northern Taxiway	Unstratified	8	317	23	175
		1A	183	2224	299	3337
		1B	4	87	4	71
		1C	2	11	1	18
		1D	1	83	0	0
		2A	6	154	12	86
GAI 99 total:			204	2876	339	3687
GAA 00	Grass Area 21	GAA 00	27	249	184	1611
GAA 00 total:			27	249	184	1611
PSH 02	Terminal 5	Unstratified	10	73	188	2555
		3	11	66	0	0
		4	0	0	1	8
		14	105	1589	813	7689
		15	222	2172	880	7589
		16	42	465	4	17
		17	10	535	2	17
		19	1	17	5	32
		20	14	67	17	228
		21	1	2	14	399
		23	19	197	1	10
		24	43	1155	270	2769
		25	9	102	0	0
		26	15	188	5	80
		27	58	667	115	1181
		28	376	5224	632	4657

			Struck flint		Burnt unworked flint	
Site code:	Site name:	Area:	Number:	Weight (g)	Number:	Weight (g)
		34	102	1192	644	2680
		35	0	0	7	71
		42A	331	3990	2134	18773
		45	22	198	8112	5268
		47	190	1492	116	1245
		49	2037	15292	6650	53850
		51	244	903	371	4885
		52	11	78	188	1641
		54	176	3403	14	468
		58	569	11047	17347	54449
		60	4	1	241	294
		61	350	4962	8335	78988
		67A	6	28	25	361
		72	203	1719	819	5609
		73	290	981	1536	9843
		75	252	2371	172	1117
		77	216	2658	574	9437
		89	33	839	132	1039
		89A	2	45	1	8
		89B	9	145	34	77
		89C	7	243	0	0
		99	181	2516	272	4200
		100	227	4927	357	5522
PSH 02 total:			6398	71549	51028	287056
LFA 05	Longford Flood Alleviation		73	372	3422	13271
LFA 05 total:			73	372	3422	13271
TEC 05	Concourse C	TEC 05	908	5616	16808	105218
TEC 05 total:			908	5616	16808	105218
All sites total:			10560	103501	108689	636287

Methodology

All the flints within the assemblage were individually examined and assigned to a broad category according to debitage, core or tool type with further distinction made using the sub-category field. A complete list of category types can be found in Appendix 1.

Debitage categories include flakes, blades, bladelets, bladelike flakes, unclassifiable waste and chips. Unclassifiable waste is here defined as shattered pieces, frequently non-bulbar, produced during knapping. Particular unretouched flake types, such as those from polished or ground implements, core rejuvenation flakes and thinning flakes, were recorded as separate categories. The terminology for retouched forms

uses standard morphological descriptions, for example Bamford (1985, 72-7), Healy (1988, 48-9) and Saville (1981, 7-11).

Table 3: Summary of the struck flint by site from Terminal 5, Heathrow.

		Site:							
Category:	Sub-category:	POK 96	WPR 98	GAI 99	GAA 00	PSH 02	LFA 05	TEC 05	Total:
Flake/broken flake	Primary flake	94	184	24		662		29	993
	Secondary flake	274	553	78	13	1673	12	215	2818
	Tertiary flake	120	359	24	5	740	7	229	1484
	Levallois flake					1			1
	Flake from a polished implement	2	6			7			15
	Unclassifiable waste	9	70	2		685	2	160	928
Blade/broken blade	Blade	7	36	2	1	64		9	119
	Bladelet	11	16			14		1	42
	Bladelike flake	15	52	5		77	1	12	162
Core preparation flake	Core face/edge rejuvenation flake	2	3			39		11	55
	Rejuvenation flake tablet	3	5			1		2	11
	Crested blade					3			3
Axe/adze sharpening flake	Axe/adze thinning flake	1	3			2			6
Burin spall	Burin spall		1		1			2	4
Microburin	Microburin		2						2
Chip/sieved chip	Chip	141	449	15		261	46		912
	Sieved chip					1377		54	1431
Core/core fragment	Single platform flake core	6	19	2		77		1	105
	Multi-platform flake core	17	60	12		125		22	236
	Levallois/other discoidal flake core		1			4		2	7
	Keeled core		1			2	1	4	8
	Single platform blade core		1			6		1	8
	Opposed platform blade core		1						1
	Multi-platform blade core					2			2
	Unclassifiable blade core					1			1
	Core on a flake	1	12	7		13		2	35
	Unclassifiable core		1			42		13	56
Nodule	Partially worked nodule	19	34	8		109	1	7	178

		Site:							
Category:	Sub-category:	POK 96	WPR 98	GAI 99	GAA 00	PSH 02	LFA 05	TEC 05	Total:
Retouched blade/flake	Retouched flake	47	107	10	2	160	2	35	363
	Retouched blade(let)	8	18		1	14		4	45
	Unclassifiable retouch	1	16			12	1		30
Scraper	End scraper	2	13	4		32		19	70
	Side scraper	6	5		1	3		3	18
	End-and-side scraper	6	15	3	2	33		15	74
	Disc scraper	1	1			1		4	7
	Thumbnail scraper	1	2	1		7			11
	Unclassifiable scraper	3	10	4		16		11	44
Knife	Backed knife	2	1			11		3	17
	Scale-flaked knife					2			2
	Edge-ground knife							2	2
	Unclassifiable knife		1			1		7	9
Microlith/backed bladelet	Microlith		1			2			3
Serrate/denticulate	Serrated piece	4	13			15		9	41
	Denticulate	4	4			8		1	17
	Notched piece	7	16			19		4	46
Piercer	Awl/piercer	7	20	2		41		4	74
	Spurred piece	3	5	1		2		5	16
	Burin					1			1
Fabricator	Fabricator					1			1
Arrowhead	Laurel leaf					1			1
	Leaf-shaped		1			1			2
	Chisel		3		1	5		1	10
	Oblique		2			3		2	7
	Barbed-and-tanged		1			4		1	6
	Unfinished arrowhead					1		1	2
	Unclassifiable arrowhead					3			3
Axe/core tool	Flaked axe		1			1			2
	Polished axe		1			1			2

		Site:							
Category:	Sub-category:	POK 96	WPR 98	GAI 99	GAA 00	PSH 02	LFA 05	TEC 05	Total:
Hammerstone	Flint hammerstone					8		1	9
Unclassifiable	Natural					2			2
Total:		824	2126	204	27	6398	73	908	10560

Cores/core fragments were classified by platform and removal type; complete specimens and tested nodules were individually weighed. Chips were defined as pieces whose broadest surface was less than 10 mm^2, including small flakes or fragments of flakes (Newcomer and Karlin 1987, 33). In order to avoid any sampling bias, a distinction was made between chips that were excavated by hand and those that were recovered by sieving.

The condition and degree of cortication was noted for each artefact, along with evidence of burning, breakage and use. Dating was attempted throughout. The flints were individually numbered and recorded in order to facilitate revisiting the material and appending additional data at a later stage. Bulk records were used for burnt unworked flint, which were quantified by piece and by weight. The data was entered directly on to an Access database.

Following the recommendations of the assessment, certain groups were selected for technological, metrical and refitting analysis. The refitting exercise involved laying out the flintwork and grouping the material according to visual similarity in raw material type. In a few cases, the heavy cortication of the flints meant that it was necessary to rely on cortex alone as a means of distinguishing related groups. Attempts to find knapping refits and conjoins were made both within and, if justified, between assemblages.

The technological analysis involved recording butt type (after Tixier *et al.* 1980, fig. 47), termination type (Cotterell and Kamminga 1987), hammer-mode (e.g. Ohnuma and Bergman 1983), extent of dorsal cortex and raw material type. The classification of flake type used Harding (1990) with slight modification. The presence or absence of platform edge abrasion and dorsal blade scars were also recorded. Metrical analysis was performed on all complete pieces within a sample, and involved recording the length, breadth and thickness of a specimen to the nearest millimetre, using standard methods (Saville 1980).

Kate Cramp wrote the initial report, having analysed and described the material from all sites except LFA 05 and TEC 05 which were undertaken by Matt Leivers, who also wrote the period discussions and edited the final report.

Condition

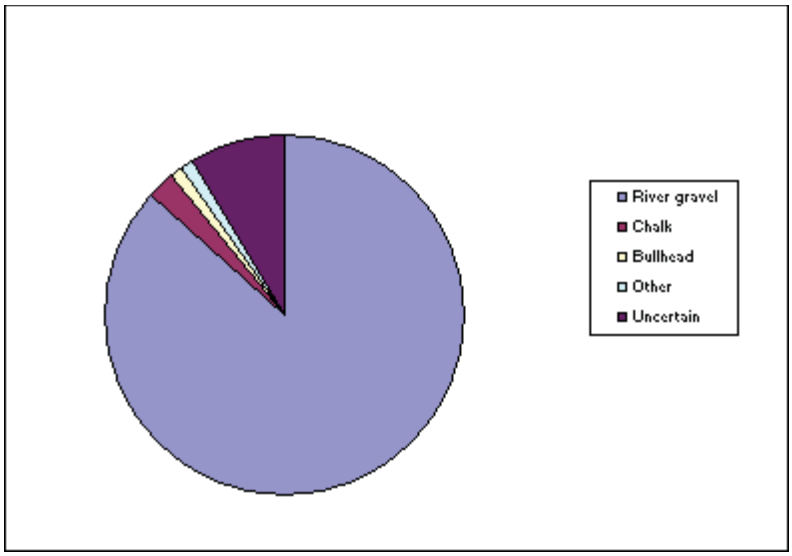
The condition of the flintwork varies by context, but the vast majority (c. 80 %) is in a fresh, undamaged state. Severe instances of edge-damage and surface rolling tend to be associated with residual pieces found in later features, which have presumably become worn following successive redeposition. Material from topsoil, ploughsoil and subsoil layers also tends to be in a poor condition.

Around 90 per cent of the flints are uncorticated; the remaining 10 per cent exhibit a cortication that ranges in density from a light incipient speckling to an opaque, sometimes bluish, white. In a few cases, a heavier degree of cortication corresponds with the chronologically earlier pieces and has occasionally assisted in the isolation of residual pieces within a later assemblage.

Raw material

The most frequently used raw material for the manufacture of the flint tools and debitage was locally available gravel flint (**Fig. 2**; only undertaken for the first phase of analysis). These nodules are readily accessible on and around the site and, although often small, would have provided a convenient and plentiful supply of flint for most flint-knapping purposes. The flint contains abundant thermal fractures, however, and was probably difficult to work as a result. Many cores seem to have shattered on impact along incipient faultlines, no doubt influencing the appearance of the later Bronze Age industry in particular, which is characterised by thick, angular flakes and pieces of unclassifiable waste. In some cases, the remains of tested and rejected nodules can be refitted to form near-complete sequences, such as the examples from ditch 535001 (PSH 02 area 49).

Figure 2: Relative contribution of each raw material source to the T5 Heathrow flint assemblage, based on analysis of selected groups from the first phase of analysis.



Site code:	River gravel	Chalk	Bullhead	Other	Uncertain	Total:
POK96	642	10	4		24	680
WPR98	1604	27	33	1	7	1672
GAI99	183	2	1		2	188
GAA00	25	1				26
PSH02	437	43	3	37	252	772
Total:	2891	83	41	38	285	3338

Around one hundred pieces of bullhead flint, distinguished by a buff-coloured band below a dark green cortex, were recorded in the assemblage. Additional non-cortical pieces may be present, but these would be unidentifiable without the distinctive cortex. This flint type occurs at the base of the Reading Beds (Dewey and Bromehead, 1915; Shepherd 1972, 114) and would therefore have been available relatively locally (less than 20 km from the site and probably closer to 10 km).

The presence of three cores, two partially worked nodules and six chips manufactured from bullhead flint implies that the nodules were occasionally being reduced on site, although retouched and utilised pieces are more common and suggest that the flint was usually brought to the site in a prepared state. For the most part, bullhead flint seems to have been reserved for knapping rather than burning, particularly in the production of tools such as knives, scrapers and serrated flakes, although very occasionally it was burnt in an unworked state.

Flint of probable chalk origin is also present in the assemblage. These pieces can be distinguished from the gravel flint by a thick, white, unweathered cortex. It is unclear whether the majority of these nodules came from mined sources or, more likely, from surface deposits of chalk flint. The Upper Chalk lies around 10 km to the south-west of the site and may have been visited for the purposes of procuring better quality flint than local gravel deposits could offer.

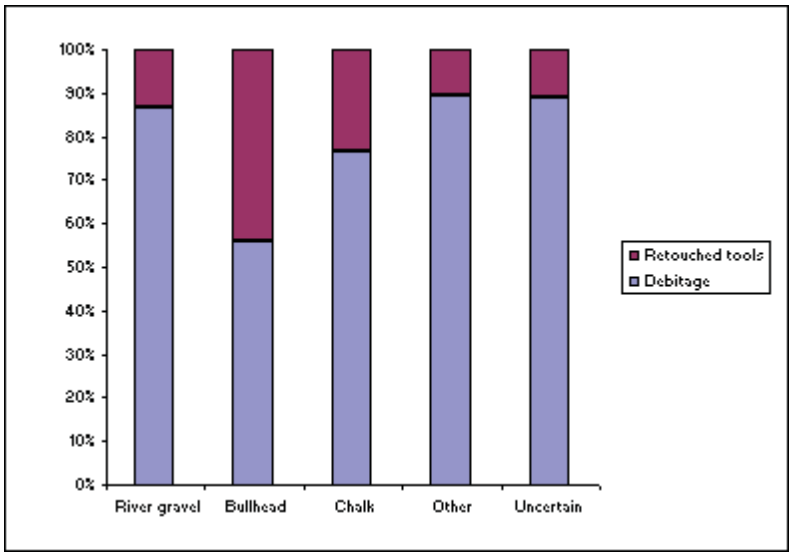
The flint type represented by the flakes and fragments of polished implements (e.g. **ILL. 8 and 9**) almost certainly comes from mined deposits, although differences in the colour of these pieces (some dark brown, others light grey) suggest that several sources were used. While these polished implements were probably brought to the site as finished artefacts, the number of polished flakes (15 pieces) in the assemblage reflects their continued usefulness as a source of raw material once their original function had been concluded, perhaps by accidental breakage. The axe fragment with indirectly refitting flake from pit 129109 on WPR 98 (**ILL. 9**) indicates, with some certainty, that the reduction of polished implements took place on site.

Finally, a number of flints within the assemblage have been made from a highly distinctive iron-stained flint. This flint type seems to have been reserved for the manufacture of 'special' pieces, such as the finely-made barbed-and-tanged arrowhead (PSH 02 area 49, western cursus ditch 605009, **ILL. 10**), the partially-polished knife (PSH 02 area 72, LN/EBA ditch 594095, **ILL. 11**) and two of the chisel arrowheads (PSH 02 area 61, MN pit 561075; area 77, MBA waterhole 510047, **ILL. 13**). The source of the flint is unknown, but it is likely to have been introduced to the site from elsewhere. Another possibility is that the nodules were carefully selected from the local gravels, which occasionally exhibit a heavy orange iron stain. Cotton notes that "it is a feature of the local scene that coloured flint seems to have been utilised for narrow blades or fine, bifacially worked pieces" (in Elsden 1997, 4) and notes leaf-shaped arrowheads from Nobel Drive and Imperial College Sports Ground and a laurel leaf from Bedfont Road, Stanwell as instances (*ibid.*). The examples selected by Cotton indicate that this phenomenon is not restricted to the later Neolithic.

It seems that locally available flint was used for most routine purposes while flint from more distant sources was invested in the manufacture of special pieces (e.g. knives, arrowheads and polished axes). Furthermore, it is likely that some of these

pieces were brought to the site in finished or near-finished form. An analysis of raw material type and category type (**Fig. 3**) seems to show that proportionally more tools are made from bullhead and chalk flint than from gravel flint; this may reflect a selective use of raw material, although a similar result might be seen if (and this seems to be the case) gravel flint nodules were being processed on site more regularly than imported nodules, thus boosting the volume of debitage relative to retouched tools.

Figure 3: Analysis of raw material use, based on analysis of selected groups.



	River gravel	Bullhead	Chalk	Other	Uncertain	Total:
Debitage	2509	23	62	34	254	2882
Retouched tools	378	18	19	4	31	450
Total:	2887	41	81	38	285	3332

The assemblage

A total of 10,560 struck flints and 108,689 pieces (636.287 kg) of burnt unworked flint were recovered during excavations at Terminal 5 (**Table 1**). The flint is quantified by area in **Table 2**. The material represents human activity from the Palaeolithic to later Bronze Age, although it is from the middle and later Neolithic

that large *in situ* assemblages of flintwork start appearing in significant number. The following offers a description of the flint assemblage from Heathrow organised in broad chronological order, with detailed discussion of the more significant groups.

Lower Palaeolithic period

The Lower Palaeolithic period is represented by one handaxe (**ILL. 1**) from a land drain on WPR 98 (context 100000) and one Levallois flake (**ILL. 2**) from PSH 02 (area 61, LBA/EIA waterhole 516082). Several possible but uncertain Palaeolithic pieces were also recovered. These pieces are technologically undiagnostic, but were isolated on account of their deep iron-staining and heavily rolled condition.

Using these criteria, additional pieces of possible Palaeolithic origin include an end scraper made on a non-flake blank (**ILL. 3**) from GAI 99 (area 1B, MBA ditch 214015) and a piercer from WPR 98 (topsoil 100000). A few stray flakes of highly speculative Palaeolithic date were also recovered from the following SG deposits: 216064 (GAI 99 area 1A, LBA pit), 100000 (WPR 98, topsoil), 502001 (PSH 02 area 49, topsoil), 502002 (PSH 02 area 49, subsoil), 512059 (PSH 02 area 49, eastern cursus ditch), 528129 (PSH02 area 77, ditch recut 510190), 529135 (PSH 02 area 49, medieval waterhole 529139), 551195 (PSH 02 area 34, voided context) and 581170 (PSH 02 area 77, LBA/EIA waterhole 581168).

Without exception, these isolated pieces occur as residual finds in much later deposits and, given their heavily rolled and iron-stained condition, probably originate from the gravels. While they indicate that the wider area was occupied by human groups in the Palaeolithic period, their contribution to a discussion of Palaeolithic activity in the west London area, otherwise well-documented (e.g. Wymer 1968; Wymer 1991; Lewis 2000a), is somewhat limited.

Upper Palaeolithic and Mesolithic periods

Context 579132 (PSH 02 area 49, medieval gully 579154) contained a possible long blade, heavily iron-stained, which is the only piece that could indicate a late Upper Palaeolithic presence at Heathrow T5. Material of this date is very scarce in the area, although Healey and Robertson-Mackay note “a possible graver of late Upper

Palaeolithic type" from the Yeoveney Lodge causewayed enclosure at Staines (1987, 95), and a small number of large blades (some retouched) and a single core with long blade affinities were recovered from Kingsmead, Horton (Leivers 2005).

Diagnostic finds datable to the Mesolithic period include three microliths (**ILL. 4**), two microburins, two burins (**ILL. 5**) and two burin spalls, all residual in later features. To this group can tentatively be added one flaked axe fragment and perhaps a number of the axe-thinning flakes, some of which could be Neolithic in date (for example, the two from WPR 98 area C4, pit 120109). It is likely that some of the blades and bladelets (e.g. the crested example from one of the cursus ditches on PSH 02 (area 16, ditch 588304), notched pieces, microdenticulates, scrapers and blade cores (e.g. the single platform blade core from PSH 02 area 99, gully 594260; the pyramidal bladelet core from TEC 05, ditch 687038) are Mesolithic in origin, but these again could equally be earlier Neolithic in date.

One of the microliths (PSH 02 area 49, MBA ditch 515196, **ILL. 4**) is of narrow-blade type (typically late Mesolithic) and can be compared to Jacobi's class 5 or 12c (Jacobi 1978, 16, fig. 6); the other (PSH 02 area 17, palaeochannel 588334) probably derives from broad-blade form (perhaps but not certainly early Mesolithic) but has lost its tip and tail. The third microlith from WPR 98 (area R2, LBA ditch 158017) is very heavily rolled; it compares most closely with Jacobi's class 5, although some of the retouch has been obscured by later damage. Both microburins were recovered from WPR 98 (area A8, LN pit 127021 and area B, EN ring ditch 142010); one is a possible medial example, while the other is of proximal type and has been notched on the right-hand edge.

The burin from PSH 02 (area 15, alluvial layer 559495 within EN ditch 617042, **ILL. 5**) is made on a flake; the burin blow has been taken on the left-hand side of the striking platform (c.f. Inizan *et al*. 1992, 81, fig. 31, no. 9). That from TEC 05 (fill 819045 in 'natural feature' 819044) is dihedral, but is not an absolutely certain example. Two possible burin spalls were recovered from WPR 98 (area R2, MBA ditch 401038) and GAA 00 (LBA ditch 158017). The flaked axe fragment, also from PSH 02 (area 58, BA ditch 623027), is heavily worn and has suffered extensively from later damage; it is possible that it originates from a *tranchet* axe but this is not certain.

Features dated independently to the Mesolithic period, such as the series of pits between and immediately east of the ditches of the Stanwell Cursus on WPR 98 (areas B and C), produced very small quantities of undiagnostic flintwork in poor condition. Several of these pits contained large assemblages of burnt unworked flint (two deposits within pit 165005 contained 1624 pieces (7534 g) of burnt unworked flint, while pits 120028 and 165003 contained single deposits of 3154 pieces (12390 g) and 852 pieces (2674 g) respectively). Pits 165005, 165007 and 165009 have been dated by thermoluminescence to the 7th and 8th millennia BC. Smaller assemblages were also recovered from pit 137021 (107 pieces, 530 g), pit 160021 (388 pieces, 924 g) and pit 165007 (164 pieces, 916 g).

On the evidence of the flintwork alone – which forms a fairly thin and disparate scatter across the site – there seems to have been only fairly low-density activity in the area during the Mesolithic period, although the reliance on diagnostic pieces may have produced a very partial picture of Mesolithic activity. The sparse distribution of microliths, for example, might be consistent with occasional, brief visits to the area during wider-ranging hunting expeditions. The presence of two microburins and two burin spalls does suggest that limited tool manufacture took place, although any associated activity has left little trace and there is no clear evidence for even the most temporary of settlement within the excavated area. This is typical of Mesolithic (especially later Mesolithic) assemblages in the area. With the exception of the Early Mesolithic site at Three Ways Wharf (Lewis 1991), no sizeable or *in situ* assemblages are known from the Colne Valley or the gravel terraces, the largest being the collection of bladelets, four microliths and a tranchet axe sharpening flake from Prospect Park, Harmondsworth (Harding 1999), and the various small groups of microliths from Runnymede Bridge, some associated with burnt flint deposits (Needham 1989) although small numbers of residual microliths, other tools and bladelets are not uncommonly encountered on excavations of later sites (for instance the Yeoveney Lodge causewayed enclosure at Staines (Healey and Robertson-Mackay 1987); Kingsmead, Horton (Leivers 2005); RMC land, Harlington (Leivers 2006); Manor Farm, Horton (Ford and Pine 2003); and several of the West London Gravels sites, particularly those north of the airport towards Harlington), indicating a widespread if sparse human presence along and around the Colne and the gravel terraces.

In view of this severely limited lithic evidence, the cluster of pits containing burnt flint within the area later defined by the Stanwell Cursus on WPR 98 is of particular importance for understanding the Mesolithic use of the landscape and its influence on activity in the Neolithic period. These features indicate that the area was perhaps of more significance than the lithics suggest: that it may have been the focus of certain formalised deposits and practices involving other materials which do not survive must be considered. Similar situations – of Mesolithic activity marked by pits in locations which later become more permanently marked by the construction of earthworks in the Neolithic period – have been noted elsewhere, at Hambledon Hill, Dorset, for instance (Healy 2004, 16), and the coincidences of Mesolithic markers and Neolithic earthworks (in some instances many millennia later) have been explored by Allen and Gardiner (2002), who note amongst other examples pits beneath the later Thickthorn Down long barrow at one terminal of the Dorset Cursus.

Early Neolithic

Diagnostic early Neolithic tools include a laurel leaf point from a medieval pit (PSH 02 area 14, pit 538289), two leaf-shaped arrowheads (**ILL. 6 and 7**), and a portion of a ground flint axe (TEC 05, pit 814081; **ILL. 28**). One of the leaf-shaped arrowheads occurred as an isolated find in a tree-throw (WPR 98 area A6, N tree-throw 180045; **ILL. 6**); the other came from a middle Bronze Age ditch on PSH 02 (area 34, MBA ditch 594129; **ILL. 7**). While leaf-shaped arrowheads are known to occur in middle Bronze Age contexts (Green 1980, 96), the incomplete arrowhead exhibits a light cortication not present on the other flints from the same ditch; this piece is therefore most likely to have been redeposited. It is likely that a number of the flakes struck from polished implements (e.g. **ILL. 8, 9 and 28**) are also of early Neolithic date (see below).

Beyond these diagnostic tools, identifying early Neolithic occupation from the flintwork alone is problematic as relatively few demonstrably early Neolithic assemblages were recovered from the Terminal 5 excavations. Those that were came predominantly from tree-throws and may reflect the deposition of midden remains (e.g. Evans *et al*. 1999). Examples include the large assemblage of flintwork from tree-throw 156191 on WPR 98. A smaller collection of what is also probably earlier

Neolithic flintwork was recovered from alluvial layer 559495 within ditch 617042 on PSH 02 (area 15). The material from tree-throw 527288 on PSH 02 (area 47) can be dated more broadly to the Neolithic, while that from tree-throw 559183 (PSH 02, area 51) could belong to an early Neolithic or early Bronze Age industry.

Early Neolithic tree-throws (entity 2894)

The early Neolithic tree-throws have been grouped as entity 2894. Most contained small quantities (<20 pieces) of chronologically undiagnostic flintwork, comprising of – for the most part – flake debitage and some cores of various types. 180045 contained a single leaf-shaped arrowhead.

The only notable members of the group were 125108, 156191 and 527288. The latter contained a total of 129 struck flints (including 99 chips) and two pieces (11g) of burnt unworked flint within two deposits, 527289 and 527291. Most of the material (116 pieces) came from the main deposit (527289) along with several sherds of Neolithic pottery; a small number of chips (13 pieces) were present in the primary fill. The majority of flints are in fresh condition and are moderately or heavily corticated.

The assemblage is composed of large quantities of chips along with a small number of flakes, blades and retouched pieces. Several of these display platform edge abrasion and have been soft-hammer struck; others have been hard-hammer struck with no platform preparation. Metrical analysis revealed a slight but not particularly marked propensity for blade production, which may provide slim evidence in favour of an earlier Neolithic date.

Most pieces have been manufactured from a good quality non-local flint that may represent the use of superficial chalk flint deposits. Several different nodules seem to be represented, however: some pieces are light brown in colour, others white and cherty or iron-stained. The chips exhibit a similar heterogeneity, suggesting that the assemblage results from several knapping episodes. No refits were found, although one group of five flakes possibly originates from the same core.

Formal tools are comparatively few in number, and include two retouched flakes and a scraper on a non-flake blank. The latter has been crudely retouched on pot-lid fragment and, technologically, appears later than rest of assemblage. It also lacks the heavy cortication seen on other flints and may therefore represent an intrusive piece. Several utilised edges were noted among the unretouched flakes.

The results of the technological analysis were inconclusive. No datable types are present in the assemblage and the debitage is not particularly distinctive. In the absence of independent dating evidence, therefore, the assemblage is broadly assigned to the Neolithic, and cautiously to the earlier part of the period.

Tree-throw 125108 contained a total of 134 struck flints within the main deposit, 125109. A further 29 pieces (10g) of burnt unworked flint were also retrieved. The flintwork is in a fresh condition. With the exception of a single flake of bullhead flint, most pieces are of local gravel flint manufacture.

The assemblage is dominated by flakes (67 pieces) and chips (61 pieces). Most of the flakes are broad and thin in appearance, often with finely flaked dorsal scars and rough platform edge abrasion. The hammermode seems to have been mixed. Blades are rare, which may suggest a date from the later Neolithic (Ford 1987), although the pit falls of dating assemblages solely on the basis of debitage form are well-known. Retouched tools are relatively few in number, and include one retouched flake and two end-and-side scrapers.

The quantity of chips in the deposit, many of which appear to originate from the same core, suggest that the scatter contains *in situ* knapping remains. The assemblage contained a single partially worked nodule (30g), which alone would not account for the quantity of knapping microdebitage and might suggest that the original cores have been removed from the scatter.

Tree-throw 156191 on WPR98 contained a total of 230 struck flints including 86 chips. This material, along with a further 137 pieces (514 g) of burnt unworked flint, was recovered almost exclusively from context 148109; a single flake came from context 156190. The flintwork is in fresh, uncorticated condition and can be dated to the early Neolithic on technological and typological grounds.

While the majority of the struck flints represent the use of locally available river gravel, bullhead flint and chalk flint are also present in small quantities. One of the serrated flakes, for example, has been manufactured on a bladelike blank of bullhead flint. Local nodules, on the other hand, seem to have been preferred for burning.

The assemblage is dominated by flakes (101 pieces) and chips (86 pieces), which together provide around 80% of the struck assemblage. One of the flakes has been struck from a polished implement, probably an axe, and can be dated to the Neolithic

period. Blades, bladelets and bladelike flakes are represented by a combined total of 25 pieces that provide around 20% of the debitage component. While less common than flakes, blades are nonetheless sufficiently numerous to suggest a date in the earlier Neolithic (Ford 1987). The majority of flakes have been struck using a soft percussor, such as an antler hammer, and many display abraded platform edges and dorsal blade scars.

A total of 86 chips were recovered from the deposit, almost certainly reflecting *in situ* knapping activity. Along with several of the flakes, these chips seem to be the product of a single core and probably result from a discrete knapping event. Only one core on a flake (42g) was recovered, suggesting that the larger elements of knapping waste were removed and deposited elsewhere. Some of the flake material may refit, although no formal attempts were made.

The assemblage contains twelve retouched tools (8.3%, excluding chips), ranging from retouched flakes and scrapers to piercing tools and serrated flakes. Numerous unretouched flints also display utilised edges. These retouched and utilised pieces are combined with the knapping waste described above, suggesting that the assemblage results from a series of activities performed on several occasions.

Early Neolithic pits (entity 2893)

Early Neolithic pits are typified by rather different assemblages. These features tend to contain small quantities (<15 pieces) of undiagnostic flake debitage and some cores of various types. Tools are limited to flakes with marginal retouch, and a serrated flake in 130051.

The C1 (Stanwell) Cursus (entities 727 and 2886)

The ditches of the C1 cursus produced an assemblage of 878 struck flints (including 404 chips) and 1214 pieces (8.28 kg) of burnt unworked flint (**Table 4**).

The material is in fresh condition and is mostly uncorticated. The flintwork probably dates mainly to the later Neolithic or Bronze Age, although a small residual component was also isolated. This element probably dates to the Mesolithic or early Neolithic period, and includes one burin, an axe-thinning flake and a number of blades and bladelike flakes.

Table 4: Quantification of the flint assemblage from the C1 Stanwell Cursus, by ditch.

Category:	Sub-category:	West ditch	East ditch	Total:
Flake/broken flake	Primary flake >75%	25	39	64
	Secondary flake 1- 74%	65	99	164
	Tertiary flake 0%	30	48	78
	Flake from a polished implement	1	1	2
	Unclassifiable waste	9	26	35
Blade/broken blade	Blade	5	6	11
	Bladelike flake	7	8	15
Core preparation flake	Core face/edge rejuvenation flake	1	2	3
	Crested blade	2		2
Thinning/sharpening flake	Axe/adze thinning flake		1	1
Chip/sieved chip	Chip	19	15	34
	Sieved chip	345	25	370
Core/core fragment	Single platform flake core	6	5	11
	Multi-platform flake core	7	9	16
	Levallois/other discoidal core		1	1
	Single platform blade core	1		1
	Core on a flake	2	2	4
	Unclassifiable core		1	1
Nodule	Partially worked nodule	4	4	8
Retouched blade/flake	Retouched flake	8	15	23
	Retouched blade(let)	2		2
	Unclassifiable retouch		1	1
Scraper	End scraper	3	1	4
	End-and-side scraper		1	1
	Unclassifiable scraper		2	2
Knife	Backed knife		3	3
Serrate/denticulate	Serrated piece	1	3	4
	Denticulate	1	3	4
	Notched piece	5	3	8
Piercer	Awl/piercer	1		1
	Burin		1	1
Arrowhead	Barbed-and-tanged	2		2
Hammerstone	Flint hammerstone		1	1
Total:		552	326	878
No. of burnt struck flints:		12	31	43
No. of broken struck flints:		62	111	173
No. of burnt unworked flints:		712	502	1214
Weight (g) of burnt unworked flints:		3900	4380	8280

This material was unevenly distributed across the east and west ditches, and also showed some spatial patterning from north to south. Compositional differences can be seen in the horizontal and vertical distribution of the flint assemblage, which may reveal the development of the monument from a chronological perspective.

Interventions along the western ditch yielded a combined total of 552 struck flints, while a further 326 pieces were recovered from the eastern ditch (**Table 4**). These figures are bolstered by the inclusion of numerous chips (<10mm^2), which account for nearly 50% of the assemblage (404 pieces). Chips are small, largely unusable flakes that are produced in great number during knapping and, as a result, tend to remain

where they fall. Most of the chips in the cursus assemblage came from the western ditch (364 pieces), and particularly from the area where there is evidence for two cursus profiles (suggesting a possible causeway), which might indicate a greater incidence of *in situ* knapping activity in this part of the landscape. Other knapping by-products (e.g. cores, rejuvenation flakes and irregular waste) are present in both ditches in approximately equal quantities, while the eastern ditch produced the only hammerstone from the monument. Even if knapping activity was performed more frequently on the western side of the cursus, therefore, there is no clear distinction evident in the deposition of the larger elements of knapping waste.

The composition of the two assemblages is broadly comparable (**Table 5**). As a group, unretouched flakes and chips together provide similar proportions of each assemblage: 509 pieces (92.0%) in the west ditch, and 269 pieces (82.5%) in the eastern ditch (Table 2). Cores are also represented in similar numbers, with 20 examples (3.6%) from the western ditch and 22 from the eastern ditch (6.8%). The contribution of retouched tools to the assemblage is slightly greater in the eastern ditch, which produced a total of 34 tools (10.4%) compared to the collection of 24 tools (4.4%) from the western ditch.

Table 5: Summary quantification of the flint assemblage from the C1 (Stanwell) Cursus, by ditch.

	West ditch	%	East ditch	%
Flakes*	508	92.0	269	82.5
Cores**	20	3.6	22	6.8
Tools †	24	4.4	34	10.4
Hammerstone			1	0.3
Total	552	100	326	100

* Including all unretouched removal types and chips, except flakes from polished implements

** Including partially-worked nodules

† Including flakes from polished implements

The tool inventory encompasses a broad range of types: from simple retouched flakes and scrapers through more specialised tools such as notched, denticulated and serrated flakes, to 'special' items such as arrowheads and knives (**Table 6**). A high incidence of use-wear was noted on unretouched edges, suggesting that a large proportion of the assemblage (nearly 25% following a brief macroscopic examination) had been utilised prior to deposition. Some tools, such as the burin from SG 617042 in the eastern

ditch, are clearly residual and are unlikely to relate directly to the use of the monument although may hint at the longevity of its significance. Others, such as the two flakes from two Neolithic polished axes from the eastern ditch (SG 594241), may have been deliberately selected for deposition. While not strictly retouched, a flake from a polished implement (probably an axe) was recovered from each ditch, SG 594241 in the east and SG 961515 in the west. The example from the western ditch had been used as a hammerstone before it was struck and subsequently burnt. It is possible that these pieces were deliberately selected for deposition, although they are separated by distance of nearly one kilometre.

Table 6: Retouched tools from the C1 (Stanwell) cursus.

	West ditch	East ditch	Total:
Flake from polished axe	1	1	2
Retouched flakes/blade	10	16	26
Scraper	3	4	7
Backed knife		3	3
Serrate/denticulate	7	9	16
Piercer	1	1	2
Arrowhead	2		2
Total:	24	34	58

The cursus ditches thus contained almost identical tool kits, with two important exceptions: barbed-and-tanged arrowheads were exclusively found in the western ditch, while backed knives occurred only in the eastern ditch (**Table 6**). Perhaps significantly, both types are distinctively early Bronze Age in date and are frequently found in 'non-domestic' contexts, such as graves and ring-ditches. The distribution of these pieces can be found in **Figure 4**, which shows the findspots of two backed knives (blue) and two barbed-and-tanged arrowheads (red) from the cursus; the third backed knife came from one of the southernmost interventions through the eastern ditch (SG 588188) and is not shown in the selected image. Excluding two outlying examples, these finds seem to cluster within a relatively limited area (c. 140m^2).

The general distribution of flintwork along the length of the cursus shows slight variation that might reflect areas of increased or decreased activity. While the western ditch produced a larger overall assemblage, the eastern ditch yielded a greater quantity (286 flints) with the exclusion of chips. As shown in **Figure 5**, the distribution of the flintwork was largely the same across the two ditches. The northernmost interventions

in each case produced a substantial collection, comprising 114 pieces or 24% of the total

Figure 4: Distribution of backed knives (red) and barbed-and-tanged arrowheads in the C1 Cursus ditches. Backed knife from southernmost intervention through east ditch (SG 526381 on PSH 02 Bed 28) not shown.

cursus assemblage (**Table 7**; **Figures 6 and 7**). Moving southwards, there is a slight reduction in lithic material from SGs 524167/549109 and SGs 524238/524234, before numbers increase again to a maximum total of 79 flints in SGs 512071/961501 at the intersection with the C2 cursus (**Figures 6 and 7**). The contribution to the total made by the individual ditch assemblages can be seen in greater detail in Figures 4a and 4b.

Table 7: Quantification of struck flint from the C1 (Stanwell) Cursus, excluding chips.

North	West ditch:			East ditch:			Both ditches:	
	Cut SG:	Total:	%	Cut SG:	Total:	%	Total:	%
	588324	26	13.8	617042	88	30.8	114	24.0
	524167	1	0.5	549109	2	0.7	3	0.6
	524238	0	0	524234	3	1.1	3	0.6
	128028	37	19.7	134029	14	4.9	51	10.8
	961515	33	17.6	603048	0	0	33	7.0
	512071	29	15.4	961501	50	17.5	79	16.7
	529311	1	0.5	512070	39	13.6	40	8.4
	529313	11	5.9	529310	4	1.4	15	3.2
	529494	7	3.7	621233	3	1.1	10	2.1
	588229	24	12.8	529312	16	5.6	40	8.4
	524398	6	3.2	526381	64	22.4	70	14.8
	588222	13	6.9	594241	3	1.1	16	3.4
South	East ditch total:	188	100	West ditch total:	286	100	474	100

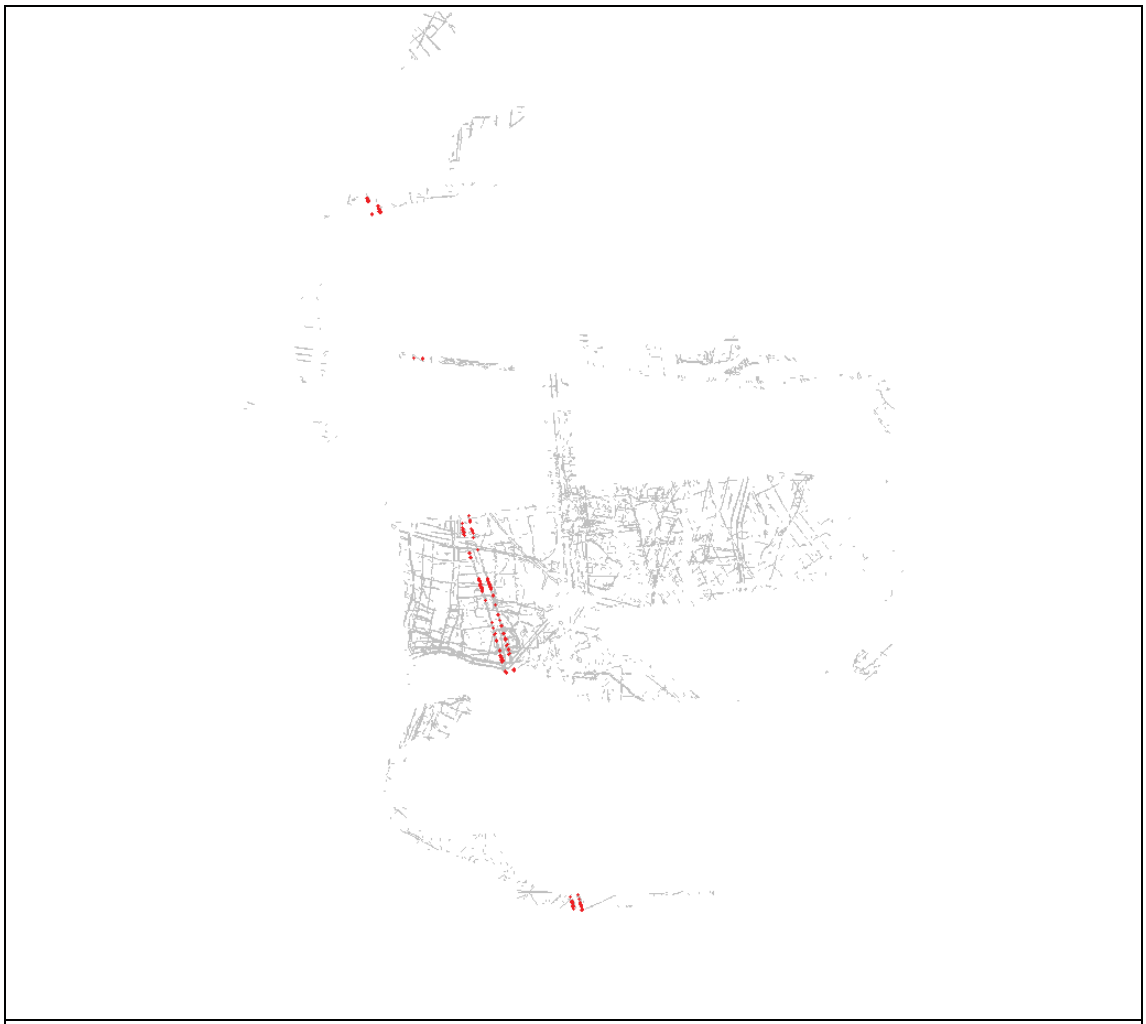


Figure 5: Distribution of struck flint (excluding chips) within the C1 cursus ditches.

One dot = one flint.

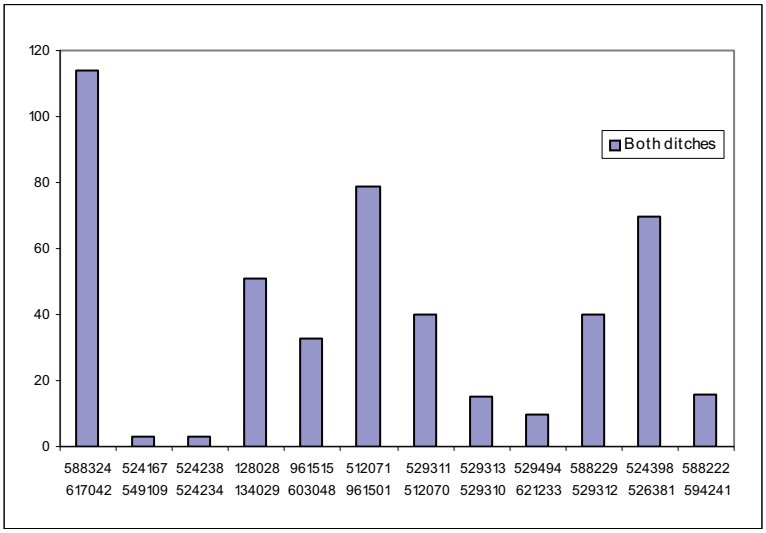
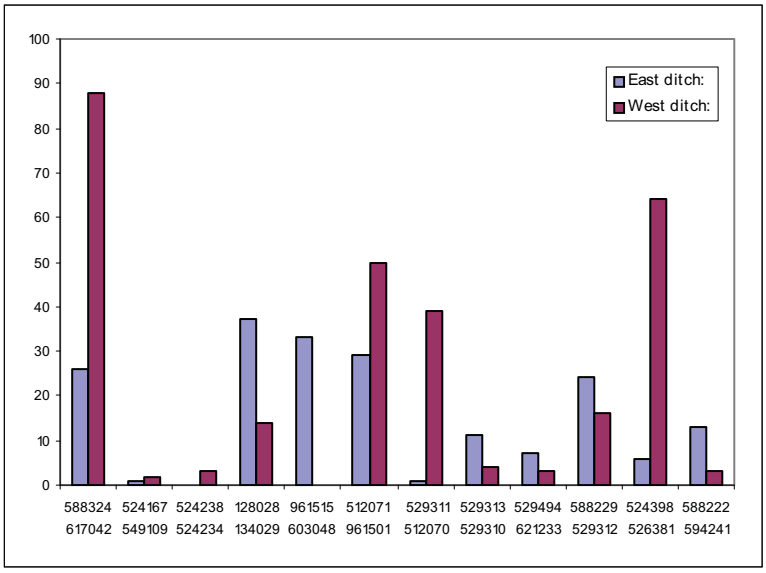


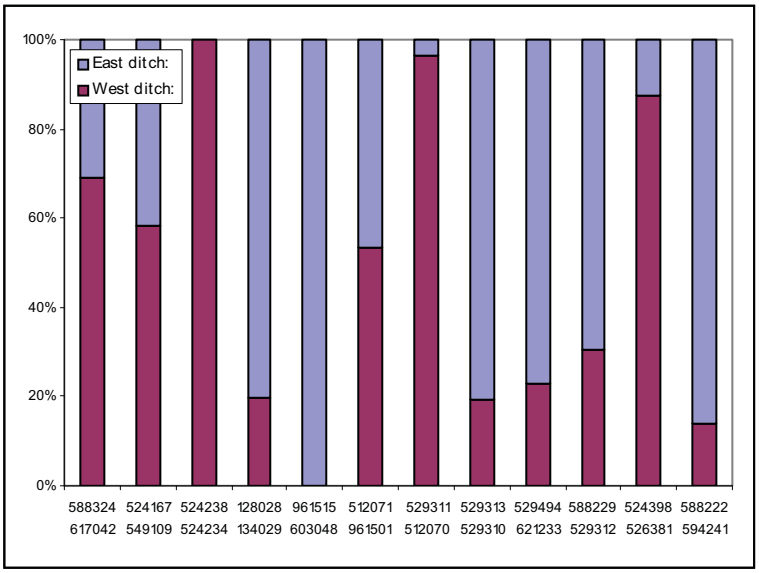
Figure 6: Total number of struck flints (excluding chips) from interventions along both ditches (East & West) of the C1 Stanwell Cursus.

North ⟶ South



(a)

North ⟶ South



(b)

North ⟶ South

Figure 7: Quantity of struck flint (excluding chips) from each intervention along the two ditches (East & West) of the C1 Stanwell Cursus, shown in terms of (a) the number of the flints, and (b) as a percentage of the total assemblage.

The burnt unworked flint shows a remarkably similar distribution to the struck flint (**Figure 8**; its distribution by weight is virtually identical). In both cases, a significant concentration of material is associated with the junction of the C1 and C2 cursus monuments, which is clearly visible around the intersection of the two eastern ditches, directly in line with the HE1 ring ditch. This location must have held a particular attraction in the Neolithic period, perhaps on account of its position at the convergence of the two cursus monuments and within sight of the HE1 ring ditch. Various activities, which seem to have involved tool use as well the burning of flint nodules, were repeatedly performed at this location over many years. It seems likely that these tasks were, in most cases, directly related to the use of the monument. The deposition of some of the more unusual pieces (e.g. polished flakes, knives and arrowheads) may have been governed by certain principles bound up with the ritual function of the site. Other activities, such as flint knapping and the deposition of knapping waste, may have been more incidental to its primary use as a monument.

Figure 8: Distribution of burnt unworked flint (by piece) within the C1 cursus ditches.

One dot = one piece.

In general, the retouched tools were mainly confined to the middle and upper fills of the ditches; very few pieces were recovered from the basal fills. As might be expected, diagnostically Neolithic pieces (eg flakes from polished implements) were found in the lower fills; typically Bronze Age pieces, such as the backed knives, barbed-and-tanged arrowheads and denticulated scrapers, tended to come from the upper fills (the two barbed and tanged arrowheads come from rank 2 fills of the recut [entity 2886]; the other types from fills of the original cut [entity 727]). While this may provide some evidence of the chronological sequence, other technologically early pieces (such as the Mesolithic burin and axe-thinning flake) were scattered throughout the fills of entity 727 and argue for some redeposition.

Some groups of flint within the C1 cursus were selected for more detailed analysis:

PSH 02: area 15, alluvial layer 559495 within ditch 617042

A total of 61 struck flints were recovered from 559495, an alluvial layer within ditch 617042. The flints are in a fresh, lightly corticated condition and several pieces are heavily iron-stained. The assemblage includes several blades, bladelike flakes and blade fragments. Platform edge abrasion and the use of soft-hammer percussion are well represented. With the exception of one burin and one retouched flake, very few retouched tools were recorded although numerous unmodified edges have been utilised.

Technologically, the material is probably early Neolithic in date, although the presence of a burin (**ILL. 5**) (probably Mesolithic) raises questions about the integrity of the deposit.

Interventions in POK 96 and WPR 98

A total of 158 struck flints and 883 pieces (4352 g) of burnt unworked flint were recovered from various interventions along the length of the two ditches that compose the Stanwell Cursus on POK 96 and WPR 98 (Table 8). The material is in fresh condition and is mostly uncorticated. The flintwork probably dates mainly to the later Neolithic or Bronze Age, although a small residual component was also isolated. This element probably dates to the Mesolithic or early Neolithic period, and includes the axe-thinning flake and a number of the blades and bladelike flakes.

The assemblage is dominated by flakes (90 pieces). Blades (two pieces) and bladelike flakes (five pieces) are present in smaller quantities, suggesting a largely later prehistoric date for the material (Pitts and Jacobi 1979, Ford 1987). Platform edge abrasion occurs occasionally on individual pieces, as does evidence for the use of soft-hammer percussion. The relatively low quantity of chips (24 pieces) does not support an *in situ* knapping activity, while cores and tested nodules are relatively numerous (11 pieces), perhaps reflecting the selective deposition of the larger elements of knapping waste.

The retouched component is fairly generalised, consisting of retouched flakes and scrapers with smaller quantities of more specialised tools such as notched and denticulated flints. A high incidence of use-wear was noted on unretouched edges. A backed knife, which can be dated to the late Neolithic/early Bronze Age, came from the middle fill of the eastern ditch. Also of note is the flake from a polished

implement, which was recovered from the basal fill of the western ditch and can be dated to the Neolithic. As might be expected, more typically Bronze Age pieces such as the thumbnail scraper, backed knife and denticulated scraper, were recovered from the upper fills. While this may provide some evidence of the chronological sequence, other technologically early pieces were scattered throughout the fills of the same ditch and argue for some redeposition.

The flints were recovered in approximately equal quantities from each ditch (**Table 9**). A total of 72 pieces came from the eastern ditch with the remaining 85 flints deriving from the western ditch. The composition of material from each ditch is mostly similar, although a greater number of cores were recovered from the western ditch (seven pieces compared to two pieces). In each case, the retouched component is similarly limited in number but broad in range. While both ditches contain approximately the same number of retouched tools, there is a greater range of types in

Table 8. Struck flint by type from the Stanwell cursus.

		SG number:													
Category:	Sub-category:	128029	128030	134032	134033	159170	178067	230244	230245	230246	230334	230335	230336	230337	Total:
Flake/broken flake	Primary flake		4	2			1		3	2		1	1		14
	Secondary flake		11	1	2			2		13	1	5	8		43
	Tertiary flake	1	3	4	1	1		2	1	4		11	5		33
	Bladelike flake	1		1	1						1	1			5
	Unclassifiable waste		2										2		4
	Flake from a polished implement								1						1
Blade/broken blade	Blade		2												2
Thinning/sharpening flake	Axe/adze thinning flake											1			1
Spall/spall bag	Spall			2					6	9	2	4	1		24
Core/core fragment	Single platform flake core		1												1
	Multi-platform flake core	2	1	1						1			1		6
	Single platform blade core	1													1
	Core on a flake						1								1
Nodule	Partially worked nodule	1									1				2
Retouched flake/blade	Retouched flake		2				1		1	1		2	1	1	9
	Retouched blade(let)		1							1					2
Scraper	End scraper												1		1
	Thumbnail scraper									1					1
	Unclassifiable scraper												1		1
Serrate/denticulate	Serrated piece											1			1
	Denticulate												1		1
	Notched piece									1	1		1		3
Knife	Backed knife											1			1
Total:		6	27	11	4	1	3	4	12	33	6	27	23	1	158
No. of burnt unworked flints:		7	56	20		1	3	4	34	519	5	85	149		883
Weight (g) of burnt unworked flints:		65	560	256		16	15	10	197	1868	16	607	742		4352

Table 9. Distribution of struck flint between the ditches and fills of the Stanwell Cursus.

		East			East ditch total:	West			West ditch total:	Other	Total:
Category:	Sub-category:	Basal	Middle	Top		Basal	Middle	Top			
Flake/broken flake	Primary flake		3	1	4	4	4	2	10		14
	Secondary flake	1	6	10	17	2	11	13	26		43
	Tertiary flake	1	15	6	22	4	3	4	11		33
	Bladelike flake	1	2	1	4	1			1		5
	Unclassifiable waste			2	2		2		2		4
	Flake from a polished implement					1			1		1
Blade/broken blade	Blade						2		2		2
Thinning/sharpening flake	Axe/adze thinning flake		1		1						1
Spall	Spall	2	6	1	9	6		9	15		24
Core/core fragment	Single platform flake core						1		1		1
	Multi-platform flake core		1	1	2	2	1	1	4		6
	Single platform blade core					1			1		1
	Core on a flake					1			1		1
Nodule	Partially worked nodule	1			1	1			1		2
	Retouched flake		2	1	3	2	2	1	5	1	9
Retouched flake/blade	Retouched blade(let)						1	1	2		2
Scraper	End scraper			1	1						1
	Thumbnail scraper							1	1		1
	Unclassifiable scraper			1	1						1
Serrate/denticulate	Serrated piece		1		1						1
	Denticulate			1	1						1
	Notched piece	1		1	2			1	1		3
Knife	Backed knife		1		1						1
Total:		7	38	27	72	25	27	33	85	1	158

the eastern ditch. In the western ditch, retouched flakes and blades predominate (seven pieces) to the almost total exclusion of scrapers (one piece). The retouched tools are mainly confined to the middle and upper fills of each ditch; very few pieces were recovered from the basal fill.

In terms of their vertical distribution, the majority of struck flints occurred in the upper ditch deposits. The basal fills contained just over 20% of the material, compared to 42% and 38% in the middle and upper fills respectively. The distribution is consistent with the assertion that the uppermost fills of the ditch were laid down in the later Neolithic and earlier Bronze Age. An analysis of the condition of the flintwork, however, showed no distributional patterning. Pieces in poor condition were scattered throughout the deposits and, as such, do not contribute to the discussion of the chronological development of the ditch fills.

C2 cursus (entity 1151)

The ditches of the C2 cursus produced a small assemblage of 1092 struck flints. The flintwork is generally in a very fresh condition and is uncorticated.

The assemblage is composed almost entirely of unretouched types, including flakes and chips. The majority have been struck using hard-hammer percussion and occasionally show rough abrasion of the platform edge. A single platform flake core was recovered from SG 133038 (context 133032). This piece has been made on a half-cobble of local gravel flint and has been reduced by a series of hard-hammer flake removals taken along one edge of an unprepared thermal platform. Similar cores came from SG 547214 (context 547237) and SG 636048 (context 648052; 2 examples). A multi-platform flake core came from SG 524226 (context 524229). The two retouched pieces consisted of a minimally-retouched piercer recovered from SG 230264 (context 962255) and a retouched flake from SG 110012 (context 122004).

The flints form a technologically coherent group, although being so few in number they are largely undatable. A broad Neolithic or Bronze Age date seems likely but, in the absence of more closely datable types, remains unconfirmed. The assemblage is fairly unremarkable in its quality and composition, and it is therefore unlikely that any of the pieces were selected for formal deposition in the cursus ditches.

The only noteworthy groups within the cursus ditches came from:

PSH 02: area 58, alluvial layer 650024

A total of 24 struck flints in fresh, lightly corticated condition were recovered from this deposit. The flintwork consists mainly of unretouched trimming flakes, the majority of which have been hard-hammer struck. A single retouched tool - a piercer - was recovered from context 650020. The flakes tend to be regularly-shaped and carefully knapped, often with rough platform edge abrasion. These technological characteristics are consistent with a later Neolithic or early Bronze Age industry.

A refitting series of six flints from context 650020 and one flint from context 650023 was identified during the analysis. Most of the remaining flintwork comes from the same core, although elements are clearly absent.

PSH 02: area 58, ditch terminus 650091

The 31 struck flints were recovered from three interventions (650053, 650057 and 650071) through ditch 650091. Most of these (27 pieces) came from ditch terminus 650071.

The assemblage consists of small flakes in fresh condition. Most pieces are neatly shaped and all assessable specimens have been hard-hammer struck with occasional rough platform dressing. Technologically, the flintwork is consistent with a late Neolithic or early Bronze Age industry.

The assemblage contains an unusually high number of preparatory flakes (ten pieces), suggesting that decortication waste was being deposited in the ditch. No refits were found, however, which might indicate the removal of the partially prepared cores for further reduction elsewhere.

C3 cursus (entity 322)

Entity 1153: C3 cursus eastern ditch

Only the southern-most segment of the original cut of the eastern ditch (SG 522123) contained artefacts. Unfortunately, the recording of these finds is inadequate to place them securely within the stratigraphic sequence: on-site recording claims that “2 flakes came from the depths of the ditch, both were struck from the same core that was also found further along”, while specialist analysis records two refitting secondary flakes of Late Neolithic/Early Bronze Age date, a single unphased tertiary flake which refits to the Late Neolithic/Early Bronze Age secondary flakes and is

therefore presumably similarly Late Neolithic/Early Bronze Age, and a piece of unclassed debitage, similarly unphased. This group is recorded only as from the cut (context/intervention 580383; SG 522123); a Neolithic/Early Bronze Age flake and a crumb of unidentifiable flint-tempered pottery came from IIa secondary fill SG522127.

This ditch segment cut by later ditch SG 522128, which contained a larger finds assemblage. All materials were recovered from II/IIa/IIb/IIc secondary fills throughout the ditch profile and consist of generally Neolithic/Bronze Age, Late Neolithic Bronze Age, Late Neolithic/Early Bronze Age or unphased debitage (16 pieces); two tools, both unphased (a retouched flake and an awl/piercer); a core (Neolithic/Bronze Age) and a partially worked nodule (unphased); and 5g of unidentifiable flint-tempered pottery.

No other features of the eastern ditch contained artefacts.

Entity 1152: Neolithic C3 cursus western ditch

At the southern end of the western ditch, recut SG 580554 contained 10 pieces of unphased lithic debitage (5 flakes, a core and 4 unclassed debitage) from a rank 6 IIa secondary fill. SG 580556 contained a single Neolithic/Bronze Age flake.

SG 580580 (possibly the earliest artefact-bearing section of the western ditch?) contained a larger assemblage. The rank 1 II primary fill contained only a single platform flake core of Late Neolithic/Bronze Age date. Rank 5 IIa secondary fills contained eight pieces of Late Neolithic/Early Bronze Age, Late Neolithic/Bronze Age and (mostly) unphased lithic debitage, along with two sherds (only 3g) of Middle Neolithic pottery and some unidentifiable flint-tempered ceramics. Rank 7 IIa secondary fills contained a further 26 pieces of Late Neolithic/Early Bronze Age, Neolithic/Bronze Age and (mostly) unphased lithic debitage, an unphased partially worked nodule, two Middle/Late Neolithic discoidal cores, and a core fragment and retouched flake of Late Neolithic/Bronze Age date.

At the northern end of the western ditch, SG 537175 contained a small number of artefacts. None came from the basal fills, being recovered from stratigraphic ranks 3, 6 and 9 (all II secondary fills). Rank 3 fills contained Late Neolithic/Bronze Age and unphased lithic debitage (4 pieces) and a piece of fired clay. Rank 6 fills contained Late Neolithic/Early Bronze Age and Late Neolithic/Bronze Age lithic debitage (3

pieces) and six sherds (weighing only 5g) of Early Neolithic pottery. Rank 9 fills contained a further 8g or unidentifiable flint-tempered pottery and Bronze or Late Bronze Age lithics (an awl/piercer and a retouched flake).

Northern cursus ditch

Rank 1 fills of the northern ditch contained single Late Neolithic/Bronze Age and unphased flakes. Rank 3 fills contained six Late Neolithic/Bronze Age (3), Bronze Age (2) and unphased (1) flakes, along with 4g of unidentifiable flint-tempered pottery. Rank 4 fills contained an unphased flake and 2g of unidentifiable flint-tempered pottery.

With the probable exception of the discoidal cores, the lithic assemblage is essentially undated. The associated pottery is unhelpful, but given that the very few diagnostic pieces are Early and Middle Neolithic, it seems most probable that the bulk of the lithics are of the same date, with some later flint work in the uppermost fills.

C4 cursus/bank barrow (entity 571)

No finds were recovered from fills in SG ranks -1, 0, or 1. Rank 2 fills (generally interpreted as edge erosion or bank collapse) contained only a small quantity of unphased lithics (3 flakes, a crude core and a retouched flake), with a further unphased flake from a Rank 3 fill.

The remaining pieces (one sherd of Early Neolithic bowl and 64 pieces of flint) all came from Rank 5 fill SG 621230, the final silting of the ditch. 55 pieces were unphased debitage (mostly flakes, some blades) with a single unphased awl/piercer and core. Diagnostic pieces consisted of six Late Neolithic/Bronze Age cores and a Bronze Age denticulated scraper.

Direct dating for the creation/use of the entity is largely absent. Dating for the end of its active life is provided by the consistent Late Neolithic/Bronze Age date of the diagnostic lithics.

Early Neolithic assemblages from other features

PSH 02: area 51, tree-throw 559183

This feature is thought to pre-date the Bronze Age field system within which it is located. The flint assemblage cannot confirm this, however, as the only potentially datable piece, the tip of an arrowhead, could belong to either a leaf-shaped form (early Neolithic) or a barbed-and-tanged form (early Bronze Age).

Of particular interest, however, is the group of 107 fresh chips that accompany the tip. These were retrieved from the 10-4 mm and 4-2 mm residues. The chips form a mostly homogeneous group of a translucent brown flint type that is almost indistinguishable from that of the arrowhead. The majority are thin, non-cortical removals with a slightly curving profile and feathered terminations. Most possess a narrow, acutely-angled, faceted platform as might be expected on a retouch chip removed from the edge of an arrowhead. Although no refits were found to confirm it, the morphology of the chips strongly suggests that they result from the *in situ* retouching of an arrowhead, which perhaps broke in manufacture.

The presence of a second, smaller but similar group of chips manufactured from a light grey-brown, slightly cherty flint might indicate that two episodes of arrowhead retouch took place; such variation in colour could easily have been present in the same blank, however.

Discussion

The early Neolithic period at Heathrow is then typified by a small number of flint assemblages primarily from tree-throws. These assemblages are characterised by a varied composition and a lack of refitting material that might support a midden source for the flints. Such a pattern of deposition has been identified elsewhere in the Thames valley, particularly at Eton Rowing Course, where the middens themselves survived and were considered to derive from ‘domestic’ as opposed to ‘ceremonial’ activity (Allen *et al.* 2004, 90). Although quantitatively much smaller, the tree-throw deposits at Heathrow T5 are qualitatively very similar to those at Eton, and may therefore result from similar activities and processes. The deposits are located against a scatter of diagnostically early Neolithic flintwork, which extends across the entire Heathrow area and reflects an extensive human presence in the landscape at this time.

Early Neolithic flint assemblages in the region tend to consist of very large, potentially structured deposits in earthworks (for instance Yeoveney Lodge, Staines: Robertson-Mackay 1987), midden deposits in spreads, pits and tree-throws, probably deriving from domestic waste disposal (for instance Eton Rowing Course: Allen *et al.* 2004; Cranford Lane and Nobel Drive: Elsden 1997), and general background scatters of tools and debitage indicating more transient activity (for instance RMC land, Harlington: Leivers 2006; Kingsmead Quarry, Horton: Leivers 2005). At Heathrow T5 the second and third of these types occur, but there is no instance of large-scale, formalised deposition.

Middle and later Neolithic

Diagnostic tools datable to the middle and late Neolithic include eight chisel arrowheads (WPR 98 area A3, ditch 149021, **ILL. 12**; PSH 02 area 77, waterhole 510047, **ILL. 13**; PSH 02 area 72, LN/BA tree-throw hole 579156, **ILL. 14**; PSH 02 area 61, MN pit 561075; PSH 02 area 77, MBA waterhole 510047; GAA 00 topsoil 402001; WPR 98, topsoil 100000). An unusually large chisel arrowhead was recovered from pit 555941 (PSH 02 area 99, **ILL. 15**). This piece was clearly not intended as a functional arrowhead and may have had another, perhaps symbolic, purpose. Similar examples of 'unfinished' or 'roughed-out' transverse arrowheads have been recovered from the Wyke Down Henge at Cranborne Chase, Dorset (Brown 1991, 119, fig. 6.5 b) and from the Neolithic rectangular enclosure at Yarnton, Oxfordshire (Bradley and Cramp forthcoming).

In addition, five oblique arrowheads were recovered from the excavated areas. Two of these came from PSH 02 (area 49 subsoil 502002, **ILL. 16**; area 49 modern ditch 543159). Two came from the topsoil on WPR 98 (**ILL. 17 and 27**). The final example came from posthole 825008 on TEC 05 (**ILL. 29**). All of these occurred as residual finds in later contexts.

Two edge-ground scraper/knives (**ILL. 30 and 31**) were recovered from Grooved Ware pit 827269 on TEC 05, amongst a larger assemblage of struck flint and pottery. These are discussed further below.

Six Levallois cores (WPR 98 area A8, pit 127021, **ILL. 18**; PSH 02 area 15, eastern cursus ditch 617042; PSH 02 area 28, waterhole recut 551374; two from PSH 02 area

54, cursus ditch recut 593298; PSH 02 area 61, waterhole 516082; one from TEC 05 ditch 820135) and six keeled cores (WPR 98 area A8, pit 136174; PSH 02 area 25, ditch 552327; PSH 02, area 77, MBA ditch 510067; TEC 05 ditch 820150, pit 823156, waterhole 833067) were also recovered. These core types have been associated with the production of blanks for transverse arrowheads (e.g. Green 1974, 84) and may therefore date to the mid or late Neolithic.

A total of 17 flakes and two fragments from polished implements, probably axes, were also retrieved (PSH 02 area 58, ditch 674014, **ILL.** 8; WPR 98 area C4, N pit 129109, **ILL. 9**; POK 96, LBA ditch 230297; POK 96, eastern cursus ditch 230333; WPR A6, EN tree-throw hole 148110; another two from WPR area C4, N pit 129109; two from WPR 98 topsoil 100000; PSH 02 area 15, layer 601140; PSH 02 area 28, MN ditch 594241; PSH 02 area 49, subsoil layer 502002; PSH 02 area 72, MBA waterhole 544072; PSH 02 area 75, M/LBA ditch 516056; PSH 02 area 99, LBA/EIA pit 554659 and pit 561278; TEC 05 waterhole 827250). These can be broadly dated to the Neolithic; as such, several are likely to represent redeposited finds.

Several flint assemblages of reasonable size were dated to the mid or late Neolithic. These came from layers (e.g. PSH 02 area 15, layer 601140; PSH 02 area 28, layers 594229, 594230 and 594231), pits (e.g. WPR 98, N pit 129109 and area 8, N pit 136177; PSH 02 area 28, MN pit 594228; PSH 02 area 73, LN pit 531011), ditches (e.g. PSH 02 area 28, MN ditch 526354; PSH 02 area 100, LN/EBA ditch 594103; PSH 02 area 58, ditch terminus 650071) and, less frequently, tree-throws (e.g. WPR 98 area A6, EN tree-throw hole 125108). The assemblages from the Stanwell and C2 cursuses, along with the flintwork from the HE1 ring ditch on WPR 98, seem largely to post-date the construction of these features. Numerous additional features of middle - late Neolithic date produced smaller assemblages of flintwork (e.g. PSH 02 area 61, N pit 510074) which, although less suitable for statistical analysis, will nonetheless contribute to the wider picture of later Neolithic activity in the area.

Middle Neolithic assemblages

Middle Neolithic pits (entity 2891)

Entity 2891 is a group of scattered pits. Most contained small quantities (<15 pieces) of undiagnostic (probably chronologically mixed but generally 'Neolithic') flint, comprising of – for the most part – flake debitage and some cores of various types.

With the exception of an end and side scraper in 574003, an end scraper in 836042 and a single chisel arrowhead in 561075 (the only pieces of flint present), tools are limited to flakes with marginal retouch. 561278 included a flake struck from a polished axe.

The only significant group came from 594228, which contained an assemblage of 98 struck flints and 146 pieces (1238 g) of burnt unworked flint, recovered from three deposits. Most of the material (71 pieces) came from the upper fill (594233) and was associated with sherds of Mortlake Ware. The flintwork is in an exceptionally fresh condition, suggesting minimal post-depositional disturbance, and is technologically consistent with the mid Neolithic date suggested by the pottery.

The assemblage is largely composed of unretouched flakes (64 pieces), most of which have been struck using hard-hammer percussion. Occasional rough platform dressing was noted. The majority of removals are trimming flakes, several of which are rather angular and irregular in form. Four single platform flake cores (weighing between 35 g and 513 g) and three partially worked nodules (between 24 g and 62 g) were recovered, suggesting the deposition of knapping waste. Retouched tools include four retouched flakes, one scraper and one carefully struck serrated blade. Several unretouched edges were also utilised.

A knapping refit was found between three flakes from deposit 594238 during the assessment; later analysis identified a few small groups of related flakes but only one additional refit between two flakes, suggesting that very small quantities of flintwork were deposited from any one core. The general impression of the assemblage is one of a combination of utilised and retouched pieces with the discarded, partial remains of several knapping events.

HE2 Horseshoe enclosure (entity 82)

Intervention 528078 through the terminus of ring ditch 528117 contained a finely-made chisel arrowhead in fresh condition, manufactured on a hinged, Levallois-style flake blank. Although incomplete, the arrowhead is probably of a hooked form similar to Green's type d (Green 1980, 101, fig. 37).

The arrowhead is accompanied by a small collection of undiagnostic flakes (19 pieces), mostly in fresh condition, which came mainly from the secondary fill 528086 (a very heavily rolled and stained hinged primary flake which may be Palaeolithic

came from 528089). A knapping refit and several additional flakes of a similar flint type suggest that there is a small quantity of knapping debitage present. The results of the technological analysis indicate a hard-hammer technology with little core preparation; a later Neolithic or Bronze Age date would be appropriate for these pieces. On the evidence of the arrowhead, the flintwork probably dates to the mid or late Neolithic.

Very little flintwork was recovered from other interventions through the same ditch. A total of eleven pieces came from 528102, five pieces from 528071 and one piece from 528101; none was recovered from the ditch terminus, 529096.

Late Neolithic assemblages

Grooved Ware pits (entity 1144)

Entity 1144 group pits containing Grooved Ware ceramics. Four contained small quantities (<15 pieces) of undiagnostic flake debitage and some cores of various types. With the exception of an oblique arrowhead in 836009 and a piercer and a small, re-shaped ground axe (both from 695027), tools are limited to flakes with marginal retouch.

Significant groups were recovered from 531011, 708007, 827269, 695058 and 127022. 531011 contained 213 struck flints in 11 deposits. Most of the flintwork came from 531015 (86 pieces) and 531019 (78 pieces). Burnt unworked flint came from ten deposits, the most prolific of which were 531012 (189 pieces, 1075 g), 531014 (171 pieces, 1275 g), 531015 (272 pieces, 1650 g) and 531019 (310 pieces, 1634 g). The flintwork is almost certainly contemporary with the Grooved Ware pottery with which it was found.

The assemblage is in a very fresh, uncorticated condition and is composed mainly of unretouched flakes (121 pieces), some of which approach bladelike dimensions. Most of the flakes are rather small; cores and larger elements of waste are virtually absent, although the presence of 69 chips suggests that some knapping activity was performed nearby. The percussion mode seems to have been mixed with a slightly greater representation of hard-hammer use; platform edge abrasion was occasionally employed.

A few utilised edges were noted along with a range of retouched tools, including five retouched flakes, one end scraper and three piercers, including one example made on

a blade. Context 531017 contained a retouched tool with a piercing point at the proximal end and some truncated scraper-style retouch along the distal end. Two multi-platform flake cores were also recovered, along with one core on a flake. A group of 20 flakes have been heavily burnt to a similar degree, perhaps in the same event; all are calcined grey-white.

Most of the flakes seem to derive from five or six individual cores, but each core is represented by a very small selection of flakes and only one knapping refit was found. A single flake of bullhead flint is also present, which could not be related to any other piece within the assemblage and appears to be an isolated example. The assemblage seems to represent an accumulation of utilised flakes and tools from a range of different activities. Many of these pieces seem to have been struck from the same core, which might indicate a relatively short interval between production, use and discard. Other pieces, such as the bullhead flake, are single occurrences and may have been in wider circulation before deposition.

708007 contained an assemblage of 35 pieces in exceptionally fresh condition. The debitage consists entirely of secondary and tertiary flakes, but the assemblage is dominated by tools, including some deliberately broken pieces: a notched scraper and two additional retouched flakes that appear to have been deliberately snapped. Another probable flake from a scraper on a non-flake blank also recovered (again, snapped) – alternatively this piece may be an inversely retouched scraper on a preparatory flake with thermal dorsal surface. In total, eight scrapers were recovered (one side scraper, three end scrapers, three end-and-side scrapers and the non-flake piece).

Other tools included three piercers, a serrated flake and a pair of backed knives. This assemblage is unusual for the very high proportion of use-wear and, particularly, retouch. The ceramic associations are Grooved Ware, and this assemblage bears comparison with that from Grooved Ware pit 827269, especially in terms of the pair of knives.

827269 contained 64 pieces of knapping waste and tools. The debitage elements of the assemblage (43 chips, five tertiary flakes, four secondary flakes, four pieces of irregular debitage and two fragments of a single core) appear to derive from a single knapping episode (or limited number of episodes) but clearly do not represent a

complete reduction sequence. No refits were identified. In addition, a tertiary trimming flake from a multi-platform core had been used as a tool.

Other tools include of a secondary trimming flake with a microdenticulate retouch and three scrapers. Two of these are end scrapers, one a side scraper. The side scraper and one of the end scrapers were broken during manufacture, and the end scraper has been rather crudely retouched across the break. The other end scraper is made on a secondary flake from a derived chalk pebble, and is rather crude in most respects. This piece seems out of place in the assemblage, although there is no indication of any intrusion: it is possible that this scraper was made by an inexperienced knapper.

The most notable elements of this assemblage are a pair of edge-ground knife/scrapers. Both are on tertiary flakes (one has a cortical flaw on the dorsal surface) with abrupt retouch on the distal end (one example very worn, the other less so) and low angle retouch and use wear on the left dorsal margin. Both have the angle between the distal end and the right dorsal margin ground smooth, over the scraper retouch. Two possibilities present themselves: either the grinding is wear caused by the use of the scrapers, or it is deliberate to facilitate their use as knives.

This material was spread throughout the two fills of the pit (827270 contained one of the scraper/knives, seven chips, the three scrapers, and the microdenticulate; 827271 the rest of the assemblage). The associated ceramics (4 sherds) all derive from a single Grooved Ware vessel of Woodlands type.

695058 contained 32 pieces, including a scraper, a notched piece and a spurred flake. Apart from two tested nodules, the rest of the pieces were flake debitage. Many of the pieces have use wear and/or gloss, and the condition and mixture of raw materials suggests that this is a small dump of discarded domestic waste.

Pit 127022 contained 52 struck flints and 289 pieces (1203g) of burnt unworked flint within deposit 127017. Technologically, the assemblage is in fresh condition and includes one Levallois core, five retouched flakes and two piercers. A microburin will be redeposited.

HE1 ring ditch

A total of 311 struck flints were recovered from the ring ditch feature located towards the eastern end the C2 cursus (**Table 10**). The large number of flints is inflated by the

Table 10. Flint by type from the HE1 ring ditch (features 107042 and 107058).

		SG:											Total:	Manor Farm, Horton
		Lower	Lower	Lower	Lower	Upper	Upper	Upper	Upper	Upper	Upper	Upper		
Category:	Sub-category:	107051	107053	107064	107065	107041	107042	107043	107056	107057	107061	107063		
Flake/broken flake	Primary flake		2	3		3		3		1		1	13	217 total
	Secondary flake		7	6	4	13		2	1		1	6	40	
	Tertiary flake	2	1	3	1	9		1			1	2	20	
	Unclassifiable waste		2					3					5	
Blade/broken blade	Bladelet	1			1								2	
	Bladelike flake											1	1	
Microburin	Microburin					1							1	
Spall/spall bag	Spall	3	6	14	4	171	2	6	2			7	215	42
Core/core fragment	Multi-platform flake core					1							1	39 total
	Core on a flake										1		1	
	Unclassifiable											1	1	12
Nodule	Partially worked nodule					3		1					4	10
Retouched blade/flake	Retouched flake	1			1	1							3	18
	Unclassifiable retouch				1	1							2	
Scraper	Unclassifiable scraper					1							1	12
Serrate/denticulate	Serrated piece											1	1	1
Leaf-shaped arrowhead													0	1
Total:		7	18	26	12	204	2	16	3	1	3	19	311	358
No. of burnt unworked flints:			73	6	5	161		1605	24	2	10	23	1909	
Weight (g) of burnt unworked flints:			199	6	43	519		6181	386	65	97	62	7558	406

presence of 215 chips, most of which were retrieved in the course of environmental sampling. The deposits forming SG 107041 were particularly prolific in the quantity of chips produced (171 pieces).

A further 1909 pieces (7558 g) of burnt unworked flint were also recovered. These were largely confined to the upper fills (1825 pieces, 7310 g), although a small quantity came from the primary deposits (84 pieces, 248 g). Horizontally, the burnt unworked flint formed a distinct concentration (along with the struck flint) in the area of the northern ditch thought to have been disturbed by a later Bronze Age cut. In the southern ditch, the burnt flint forms a wide, dense spread in the central sections. Comparatively little burnt material was recovered from the termini of either ditch.

The assemblage consists mainly of unretouched debitage in very variable condition. Excluding chips (215 pieces), flakes are the most common removal type. These pieces tend to be small and squat in shape. The reduction strategy involved a mixed hammer mode and the occasional use of platform edge abrasion. Although two bladelets and one bladelike flake were recovered, blades are conspicuously absent from the collection. The flake-based character of the assemblage might indicate a date in the later Neolithic or Bronze Age (Pitts and Jacobi 1979; Ford 1987).

General knapping activity is indicated by the presence of 215 chips and a small number of cores (three pieces) and tested nodules (four pieces). All of the cores have been aimed at the production of flakes and, technologically, probably belong to the same flintworking tradition as the debitage. Without exception, the cores came from the upper fills of the ditch.

Limited evidence for microlith manufacture is provided by a single proximal microburin from context 107037 (SG 107041). This piece can be dated broadly to the Mesolithic, but is unlikely to be contemporary with the remaining assemblage.

The retouched component is restricted to seven pieces including three retouched flakes and a possible scraper fragment. Also of note is the bifacially retouched fragment from context 157218 (SG 107065), which may have been a knife or arrowhead when complete. Context 161180 (SG 107063) contained a serrated tool made on a bladelike secondary flake.

The variable condition of the material and the paucity of chronologically distinctive types does not allow much confidence in dating. The only datable piece (the

microburin) probably does not belong with the debitage component. Morphologically and technologically, the remainder is most consistent with a later Neolithic or Bronze Age industry and it is not unlikely that this material is of mixed date.

Other feature assemblages

PSH 02: area 61, pit 510074

A total of 11 struck flints was recovered from the deliberate backfill of this isolated late Neolithic pit. The assemblage is particularly remarkable on account of the quantity of retouched tools that it contains: a total of six pieces including three retouched flakes, two scrapers and one chisel arrowhead. The latter provides a date in the late Neolithic for the assemblage.

It is possible that the flintwork represents a tool-kit, complete with two cores, or perhaps a formal deposit associated with the backfilling of the pit. The number of retouched pieces, several of which are carefully worked, suggests a deliberate selection of flintwork rather than a general assortment of discarded pieces. It is unusual that none of the flints are burnt and that no burnt unworked flint was recovered from the same feature, which again argues against an ordinary deposit of domestic refuse. It seems unlikely that they were manufactured purposely for deposition, however, as several pieces exhibit macroscopically visible use-wear.

TEC 05: pit 705080

This small, exceptionally fresh assemblage consisted of a small collection of secondary and tertiary flakes (some utilised) and several retouched pieces. Tools included a thick distal-trimming flake with serrations and coarser denticulations to the concave left-hand edge and use-wear, in particular rounded scraping use-wear to distal right-hand edge, a flake with neat edge retouch to sporadic areas of the distal and proximal edge which may be a knapped down scraper, and a heavily calcined spurred flake with piercing use-wear. There were also two scrapers, one an end scraper, the other a disc.

WPR 98: pit 129109

A total of 57 struck flints were recovered from two deposits in pit 129109, which was excavated in quadrants. The flintwork can be dated to the Neolithic on the presence of one fragment and three flakes from three polished implements; the general

technological appearance of the flintwork might support a date in the later half of the period.

The majority of flints are in a fresh, uncorticated condition. While local gravel flint is most heavily represented, a few flakes of bullhead flint along with several pieces of a distinctive derived flint are also present. Local nodules seem to have been preferred for burning.

Most of the material (53 pieces) came from the upper fill; only four pieces were recovered from the lower fill. A further 710 pieces (4130 g) of burnt unworked flint came from the pit, again mainly from the upper fill (707 pieces, 4113g). There was little horizontal variation in the distribution of either struck flint or burnt unworked flint.

The assemblage is mostly composed of flakes (38 pieces). Blades, bladelets and bladelike pieces are less numerous (seven pieces), suggesting a flake-based later Neolithic technology. The majority of flakes are broad and thin with fine dorsal flake scars. Many have been carefully struck from an abraded platform edge using a soft-hammer percussor. The presence of a platform rejuvenation tablet reflects attempts to maintain the flaking angle during knapping. Two possible axe-thinning flakes were also recovered.

The paucity of preparatory flakes, pieces of unclassifiable waste, chips and cores suggests that the assemblage contains little knapping waste. No refits were found, despite the presence of several related groups of flint, which again suggests that the assemblage does not result directly from knapping activity. An important exception is the polished axe fragment from the northeastern quadrant and the indirectly refitting flake from the southeastern quadrant (**ILL. 9**). It is possible that other pieces that might have refitted have been lost to truncation, although it is not uncommon to find that only elements of a polished implement have been selected for deposition; examples of both ‘cores’ and flakes are known from the nearby Neolithic causewayed enclosure at Staines, Surrey (Robertson-Mackay 1987, 104 and 107).

Two additional polished flakes, originating from two different axes, were recovered from the northwestern and northeastern quadrants. As seen at Ascott-under-Wychwood in Oxfordshire (Cramp 2007), it is not unusual for several axes to be represented by single flakes. It seems that, once knapped, the flakes from polished

implements had a fairly wide and perhaps prolonged circulation, with the effect that material from the same implement was only rarely - and perhaps unintentionally - recombined for deposition.

Beyond the group of polished flakes, there were very few formal tools in the pit. A retouched bladelet was recovered from context 129104 (NW quadrant) and a notched flake was recovered from context 129095 (SW quadrant). Numerous unretouched edges show evidence of use.

PSH 02: area 28, layer 594231

This deposit contained a total of 37 struck flints along with a single fragment (1g) of burnt unworked flint. The assemblage is mainly composed of flakes (25 pieces), two of which have been retouched. The majority of removals have been hard-hammer struck from unprepared platforms. Three multi-platform flake cores, ranging in weight from 17 g to 158g, and one core fragment were also recovered. Most of these have been neatly reduced using local gravel flint and are likely to be of later Neolithic; the debitage is consistent with an industry of this date, although it is possible that the flintwork derives from the disturbed upper levels of pit 594228, in which case a mid Neolithic date would seem likely.

WPR 98: area A8, pit 136177

A total of 32 struck flints were recovered from feature 136177, an unphased pit on WPR98. These were contained within two SG deposits, 136178 and 136179. The majority of the assemblage was recovered from deposit 136178 (21 pieces). No burnt unworked flint was recovered from the feature.

The material forms a technologically coherent group of a broad late Neolithic date; no diagnostic pieces were recovered to allow the flintwork to be more closely dated. A small number of residual flints are probably present, including a minute opposed platform bladelet core (6g) that could be Mesolithic or perhaps earlier Neolithic in date.

PSH 02: area 15, alluvial layer 601140

An assemblage of 56 struck flints in poor condition was recovered from this layer. Given its rolled and damaged state, the flintwork has clearly been redeposited and cannot be assumed to be contemporary. The considerable quantities of burnt

unworked flint (363 pieces weighing 2935g) may represent the scattered remains of a larger deposit, such as a burnt mound.

The assemblage is markedly flake-based, containing 33 flakes and four flake cores that range in weight from 33g to 80g. Several pieces of unclassifiable waste were also recorded. The retouched component is limited to two retouched flakes and two piercers, none of which is chronologically distinctive.

The flake from a polished implement can be dated to the Neolithic period and is the only datable type within the assemblage. The remaining flintwork may well be of similar date, but it does not form a coherent or necessarily contemporary group. A broad Neolithic date is therefore proposed for what is probably a mixed assemblage.

Discussion

From the middle and later Neolithic, the deposition of middened flintwork in tree-throws seemingly declines in favour of deposition in deliberately cut pits, a phenomenon also noted some 13 km away at Dorney, Berkshire (Allen *et al.* 2004) and elsewhere in southern Britain (Evans *et al.* 1999). At Heathrow T5, this pattern is born out by the changing depositional regimes of pottery: while plain bowl ceramics are primarily (although not exclusively) found in tree-throws, Impressed Wares and more particularly Grooved Ware are found in pits (Leivers, this volume). Whether the pits represent the same kinds of discard as the tree-throws is difficult to determine, although there are some indications of more selective deposition: some of the lithic assemblages (e.g. PSH 02 area 61, pit 510074) appear to have been carefully composed of retouched, and – in the case of some Grooved Ware pits – broken pieces, suggesting that certain principles governing the placement of the flintwork and other materials. This same selective nature is seen at the Dorney sites (Allen *et al.* 2004), although there the associated ceramics were thought to derive from 'occupation' (presumably discard of domestic waste) whereas at Heathrow T5, there are more indications of structured deposition (Leivers, this volume).

Very similar pit deposits containing Middle Neolithic ceramics and small lithics assemblages have been encountered on sites in the locality at RMC land, Harlington (Leivers 2006), Stockley Park, Dawley and Walled Garden Farm, Sispon (MoLAS 1993) and especially at Caesar's Camp at the north-eastern corner of the airport (Cotton 1993). Later Neolithic pits also occur quite widely, for instance at Lower Mill

Farm, Stanwell (Jones and Ayres 2004), Prospect Park (Harding 1999), Holloway Lane (Merriman 1990; MoLAS 1993), Walled Garden and Home Farms (MoLAS 1993), Iver (Lacaille 1937) and Imperial College (Gardiner nd). Cotton notes the repeated occurrence of Neolithic pits containing one of two types of deposit: large sherds of decorated pottery accompanied by small quantities of struck flint; and large quantities of struck flint accompanied by at most a few small pot sherds (1993, 340-1). Both Middle and Late Neolithic pits have repeated associations between broken pottery vessels, transverse arrowheads and flaked fragments of polished axes. In this respect the Heathrow T5 pits discussed above are similar, although they do not fit entirely comfortably within Cotton's general characterisation, but are for the most part like the former.

The pieces from the various earthworks are difficult to characterise. Although qualitatively larger than the collection from earlier interventions into the ditches (Cotton 1990a & b) the material from the Stanwell Cursus is no more indicative of particular activities in an around the cursus (and is for the most part probably contemporary with the infilling of the ditches rather than the use of the structure). The same is true of the C2 and C3 cursuses: for the latter refitting flakes of Late Neolithic – Early Bronze Age type in the lower fills need not date the construction, although - with the probable exception of a number of discoidal cores - the lithic assemblage is essentially undatable.

More can perhaps be gained from a comparison of the assemblages from two ostensibly very similar earthworks: the inner ditch at Manor Farm, Horton (Ford and Pine 2003) and the Heathrow T5 HE1 enclosure. Ford considers the Manor Farm enclosure to belong to the class of non-megalithic funerary monuments. The suitability of this assignation is open to question, but there is certainly no reason to suppose that the HE1 enclosure was associated with any funerary activity. That being said, the depositional signatures at the two sites have a number of similarities, as shown in Table 9. The quantities and range of types present (and absent) are very similar (as are the relative proportions), and both assemblages are associated with a range of other materials (stone, bone, fired clay). The most notable difference between the two sites is that while at Horton most of the lithics were recovered from the lower ditch silts, in association with a rich ceramic assemblage, at Heathrow the pieces were spread fairly evenly throughout the fill sequence, with those in the lower fills having

more evidence of residuality (in the form of post-depositional damage) than those from the surviving upper fills, which were fresh and apparently associated with the use of the structure. Ceramics were most notable by their absence, which fact is perhaps the greatest difficulty in accepting the tentative suggestions that the HE1 material derives from food processing and consumption (perhaps feasting); the Horton material is interpreted as "domestic material being deposited in… apparent clusters and concentrations… suggest[ing] that this is at least partly deliberate" (Ford and Pine 2003, 32). Ford and Pine also note parallels in size and plan between the Manor Farm inner enclosure and 'Long Barrow' 163a on Thickthorn Down, Dorset (Drew and Piggott 1936). Although there are very clear differences in the forms of these sites, Thickthorn Down and HE1 at Heathrow share further parallels, not least their association with cursuses, and the (at Thickthorn direct, at Heathrow implied) relationship with Mesolithic features.

It is likely that much of the residual flintwork in later features probably also relates to activity in this period, including perhaps more generalised deposits of the flintwork discarded on the ground surface rather than into cut features.

Bronze Age

Diagnostic tools of Early Bronze Age date include six barbed-and-tanged arrowheads, four of which came from PSH 02 (area 49, western cursus ditch 605001; LBA ditch 526205 and western cursus ditch 605013, also on area 49; area 42A, post-medieval ditch 549114). The fifth came from the topsoil on WPR 98 (context 100000); the sixth from waterhole 823181 on TEC 05. In addition, an unfinished arrowhead from waterhole 708014 on TEC 05 is probably an Early Bronze Age piece. A total of 11 thumbnail scrapers can also be attributed to the early Bronze Age. Most of these (seven pieces) came from PSH 02 (area 28, LBA pit 543263, **ILL. 20**; area 23, feature 544177; area 49, subsoil 502002; two from area 49, M/LBA ditch 514009; area 49, pit 527124; area 77, MBA ditch 510068). Single finds came from GAI 99 (area 1A, feature 222079) and POK 96 (context 962353), while two unstratified examples were recovered from the topsoil on WPR 98 (context 100000).

The majority of the sixteen backed knives present in the assemblage probably date to the later Neolithic or early Bronze Age. Again, most of these (11 pieces) were recovered from PSH 02 (e.g. area 49, ditch 543172, **ILL. 21**); two other examples came from POK 96 (LBA ditch 230268 and eastern cursus ditch 230323), two came from waterholes on TEC 05 (708014 and 833067); while a single unstratified find came from the topsoil on WPR 98 (context 100000).

A total of 16 denticulated scrapers with coarsely-toothed edges were also recovered and can be dated broadly to the Bronze Age. These are commonly associated with ditches (e.g. POK 96, LBA ditch 230268; POK 96, MBA ditch 230224; POK 96, LBA ditch 230051; WPR 98 area A6, M/LIA ditch 141084; PSH 02 area 15, EN ditch 617042; PSH 02 area 17, EN ditch 588324; PSH 02 area 34, MBA ditch 555670; PSH 02 area 72, MBA ditch 594080; PSH 02 area 75, M/LBA ditch 516060), perhaps reflecting the circumstances of their use.

In addition to these isolated diagnostic types, several complete assemblages of Bronze Age flintwork were identified. Some of this material came from pits and tree-throw holes (e.g. GAI 99, pit 216063; WPR 98, pit 127022; WPR 98 area A7, tree-throw hole 130206; WPR 98 area A8, pit 148042; PSH 02 area 49, pit 527124; PSH 02 area 58, pit 639072; PSH 02 area 72, pit 579172) but waterholes were also particularly prolific in the quantity of flint they produced (e.g. WPR 98 area R2, waterhole 157065; PSH 02 area 77, MBA waterhole 510047; PSH 02 area 49, LBA waterhole 563032; PSH 02 area 77, LBA/EIA waterhole 581168). Ditches were also favoured spots for deposition (e.g. POK 96, ditches 961020 and 961508; PSH 02 area 42A, ditch 555348; PSH 02 area 49, ditch 535001; PSH 02 area 100, ditch 555542; TEC 05, ditch 695033).

Early Bronze Age

TEC 05: ditch 695033

The 18 pieces from this feature (fill 695034) were mostly fresh, uncorticated flakes, predominantly hard-hammer struck with rough platform edge abrasion in places. The debitage was fairly regularly-shaped and neatly struck, and many edges were utilised, often heavily. Tools were limited to an end-and-side scraper and a secondary flake with neat invasive semi-abrupt retouch on the right dorsal margin and abrupt invasive

retouch on the distal end. The ceramic associations of this material are Middle Bronze Age, although the lithics appear earlier (Early Bronze Age).

PSH 02: area 49, pit 527124

A total of 276 struck flints and 44 pieces (421g) of burnt unworked flint were recovered from seven deposits within pit 527124. Excluding chips, which were most abundant in 527119 (30 pieces) and 527120 (33 pieces), most of the material came from deposit 527113. The assemblage is in a fresh, uncorticated condition and contains an unusually high incidence of iron-stained pieces.

While flakes and pieces of unclassifiable waste are most numerous, the assemblage contains an unusually high number of retouched tools (23 pieces), including six retouched flakes, seven scrapers (e.g. **ILL. 22**), four piercers and one serrated flake. The presence of a thumbnail scraper and a burnt scale-flaked knife fragment indicate a likely date in the Early Bronze Age for the material. This is confirmed by the general technological character of the flintwork, which represents a flake-based industry reliant on the use of hard-hammer percussion but with very limited use of platform edge abrasion.

The presence of ten flake cores and four partially worked nodules along with 91 chips suggests that knapping was performed either directly into or within short distance of the pit. The refitting exercise, however, did not identify many refits. Context 527113 contained a knapping refit between two flakes, while a flake in context 527114 was found to refit to a core in context 527113. Several small groups of flakes were noted for their similarity and may derive from the same core, although no additional refits were found. That none of the retouched pieces could be assigned to a related group suggests that these tools were manufactured elsewhere and were introduced to the pit as isolated pieces.

PSH 02: area 49, hedgerow 527115

The substantial quantity (41 pieces) of fresh flintwork from this feature almost certainly derives from its truncation of pit 527124 (above). The flintwork is technologically indistinguishable from the pit assemblage, and is characterised by the use of hard-hammer percussion and little or no platform preparation. Some of the iron-stained flakes may even belong to the related groups noted in the pit assemblage.

The collection includes a piercer (**ILL. 23**), which compares closely in form with some of those from pit 527124.

PSH 02: area 100, ditch 594103

A small assemblage of 22 struck flints and nine pieces (51g) of burnt unworked flint was recovered from the single fill (594104) of this ditch feature on area 100. The flintwork is in fresh condition and is probably contemporary with the pottery from the same deposit.

The assemblage contains around six pieces of a distinctive iron-stained flint with a thin, cream cortex. This flint type appears to represent the use of a non-local source, and has been used for the production of a neatly retouched end scraper and a number of thick, broad, regularly-shaped flakes. No refits were found, however, and the source of the flint is as yet unknown.

Other retouched pieces include two retouched flakes and an end-and-side scraper; several unretouched flakes have also been utilised. A relatively high proportion of the assemblage has been burnt (nine pieces), mostly calcined grey, suggesting that some of the material originates from a hearth or other burnt deposit.

HE 3 Ring Ditch (entity 2822)

No finds were recovered from the primary fills (SG 584082). Secondary fills (SG 584083) contained only a blade (broadly Mesolithic/Neolithic), an unphased spall and an unphased secondary flake. Above these fills were a series of alluvial floodplain deposits (SG 584084). These contained a range of ceramics consisting of Beaker, Collared Urn, post-Deverel Rimbury and Romano-British. Later ceramics are represented by single small sherds (2 and 3g), and there are also five crumbs (6g) of unidentifiable flint-tempered pottery likely to be either Early/Middle Neolithic or (more probably) Middle/Late Bronze Age. The lithics from these alluvial deposits consist mostly of unphased flake and non-flake debitage (four pieces of each), spalls (two) and cores/tested nodules (two). Chronologically diagnostic pieces are limited to a fragment of a fragment of a possible petit tranchet or chisel arrowhead (Middle/Late Neolithic) and a thumbnail scraper (Early Bronze Age).

This chronological significance of this assemblage is difficult to assess. The most diagnostic pieces are Late Neolithic and/or Early Bronze Age, and *may* indicate a date at which the ring-ditch/barrow was in use. However, the Beaker and Collared Urn

sherds (six sherds; 12g) are highly abraded and unlikely to be *in situ*, although the occurrence here of these otherwise-rare ceramic types in association with at least one contemporary lithic tool does seem to point to activity at that time in the vicinity, which may be associated with this putative barrow.

Discussion

While the Early Bronze Age period is amply represented by residual diagnostic pieces, the paucity of coherent *in situ* assemblages dating to this time is striking; the pottery assemblage from Heathrow seems to register a similar hiatus, as do lithic assemblages from other sites in the locality (for instance RMC land, Harlington: Leivers 2006), although at others (especially Mayfield Farm, East Bedfont) large assemblages of Early Bronze Age flint work have been recovered during fieldwalking (Lewis 2000b) and at Kingsmead Quarry, Horton relatively large quantities of diagnostic tools (especially arrowheads) indicate a very definite Early Bronze Age presence (Leivers 2005). Also noteworthy is the dismembered aurochs burial with associated barbed-and-tanged arrowheads from a pit in Holloway Lane, Harlington (Cotton *et al.* 2006) .These sites take their place against a wide distribution of similar artefacts that seem to belie the absence of activity indicated by the ceramic record. Brown and Cotton have suggested that the distribution of barbed-and-tanged arrowheads indicates that settlement was quite widespread, although many may have derived from hunting or fighting losses (2000, 85). In addition, a linear barrow cemetery on the southern edge of the Heathrow terrace between Stanwell and West Bedfont point to further activity in the area. If Cotton, Mills and Clegg are correct in their reading of the distribution of round barrows along the Colne valley as on the margins of settled land (1986, 41) then this may go some way to explaining the absence of *in situ* lithic assemblages of this date from the Heathrow T5 excavations on the plateau.

Middle Bronze Age

POK 96: ditches 961020 and 961508

A total of 42 struck flints and 195 pieces (552g) of burnt unworked flint were recovered from ditch 961020; ditch 961508, which is located some 90m to the northeast, contained a further 55 struck flints and 17 pieces (74g) of burnt unworked

flint. Technologically, the material forms a coherent assemblage broadly Bronze Age date. The presence of a minimally-retouched backed knife, if contemporary, allows the date to be refined to the earlier half of the Bronze Age, while quantities of Deverel-Rimbury pottery from both features suggest a Middle Bronze Age date for the deposits. Other retouched tools include nine retouched flakes and blades, three scrapers, one serrated flake, one piercer and one denticulated scraper.

PSH 02: area 27, pit 552175

A single deposit (552176) within pit 552175 contained an assemblage of 45 fresh, uncorticated flints and 50 pieces (148g) of burnt unworked flint. Technologically, the flintwork probably belongs to a Middle Bronze Age industry, a date that is consistent with the Deverel-Rimbury pottery assemblage recovered from the same deposit.

The assemblage is dominated by flakes (23 pieces) and unclassifiable waste (eight pieces). The majority have been hard-hammer struck from local gravel flint nodules; platform edge abrasion was rarely used. The flint contains frequent thermal flaws and may not have been of a particularly high quality.

A single platform flake core with five refitting flakes was identified during the refitting study. This group consists of a cobble that has been split in two along a thermal fracture, following which a series of flake removals were taken along one edge of this surface. While this refitting group indicates the presence of material from the same knapping event, the relatively low number of chips (eight pieces) argues against *in situ* knapping activity.

The assemblage contained two retouched pieces, including a piercer. A nodule of flint with a natural perforation through the centre, perhaps deliberately deposited, was also recovered. Despite the evidence in the pit deposits for *in situ* burning, only a single struck flint has been burnt. The feature seems to have been located in a ‘grove’ of tree-throw holes, which were perhaps the focus of various flint-related activities and deposition.

PSH 02: area 49, ditch 527068

A total of 29 struck flints were recovered from two deposits (527076 and 527085) within this intervention through ditch 536096. The assemblage is largely composed of fresh, uncorticated flakes (11 pieces) and includes a small quantity of chips (nine

pieces). A possible hammerstone was also recovered, along with three partially worked nodules and one core.

It is likely that the collection represents a small knapping deposit. From its technological appearance, it is probably contemporary with the Deverel-Rimbury pottery from the same deposit. No additional flintwork was recovered from two other interventions, 517224 and 555390, through same length of ditch.

PSH 02: area 72, pit 579172

A total of 67 struck flints was recovered from three deposits within pit 579172. Most the material came from deposit 579177 (64 pieces). The flintwork forms a fresh, uncorticated, technologically-coherent assemblage, and can be dated through its association with several sherds of Deverel-Rimbury pottery to the Middle Bronze Age.

The assemblage predominantly consists of squat, angular, hard-hammer flakes with no platform preparation. The collection includes two cores, one tested nodule, one flake from a hammerstone and a small number of chips (nine pieces). Several flakes of the same flint type were noted, suggesting that the assemblage derives from a very limited number of cores, although fewer refits were identified than expected.

Retouched pieces include a serrated blade (**ILL. 24**) and a scraper, both from context 579177. These pieces seem to have been more carefully worked than other pieces in the assemblage and are manufactured from a seemingly better quality flint, perhaps indicating a different origin to the rest of the assemblage.

PSH 02: area 77, waterhole 510047

The five deposits within waterhole 510047 contained an assemblage of 35 struck flints and eight pieces (127g) of burnt unworked flint. The flintwork is in reasonably fresh condition, although a few pieces exhibit modern edge damage. Most of the material (19 pieces) came from a flint scatter on the surface of the feature (context 562035), and was associated with sherds of middle Bronze Age pottery.

The majority of flakes consist of angular, hard-hammer removals from local gravel flint nodules. A few utilised edges were noted. Retouched tools include an end scraper from context 562037 (**ILL. 25**) and a chisel arrowhead manufactured from an unusual red-coloured flint from context 562038. The latter can be dated to the Middle or Late

Neolithic and may be a residual element in an otherwise Middle Bronze Age assemblage. The associated flintwork is not particularly chronologically distinctive, however, and would be consistent with an industry of later Neolithic or Bronze Age date.

PSH 02: area 99, waterhole recut 559665

A total of 45 struck flints and 75 pieces (1521g) of burnt unworked flint were recovered from the recut of this Middle Bronze Age waterhole. Most of the material came from the main deposit, 559646. The flintwork is in fresh condition and is technologically consistent with the date of the feature provided by the presence of several sherds of Deverel-Rimbury pottery. The assemblage contained a reasonable quantity of tools, including five retouched flakes, one retouched blade, two unclassifiable scrapers and one notched flake.

PSH 02: area 100, ditch terminus 555542

An assemblage of 34 struck flints was recovered from the terminus of ditch 555542; most came from deposit 555550. A further 47 pieces (578g) of burnt unworked flint were also retrieved from the feature. Very little flintwork was recovered from other interventions along the same length of ditch.

Technologically, the flintwork is consistent with the Middle Bronze Age date provided by the pottery. Most pieces have been hard-hammer struck and occasionally display platform edge abrasion. The presence of a retouched Levallois flake, clearly residual from its condition, indicates a probable mid or later Neolithic element; the rejuvenation flakes may also belong with this residual earlier component.

Late Bronze Age

PSH 02: area 49, waterhole 563032

An assemblage of 40 struck flints and 136 pieces (1009g) of burnt unworked flint was recovered from waterhole 563032. The flintwork was distributed fairly evenly between five deposits, with none producing more than seven pieces.

The collection includes two reused pieces, consisting of a knapped-down scraper and a scraper on a reused flake. Both episodes of reuse probably date to the Middle or Late Bronze Age, when recycling lithic material seems to have been a common aspect

of flintworking (Young and Humphrey 1999); the original blanks may be Neolithic or earlier Bronze Age in date. The remaining flintwork forms a fairly mixed group, and may be residual given the nature of the deposits.

PSH02: area 75, pit 547008

A total of 58 struck flints and 19 pieces (93g) of burnt unworked flint were recovered from four deposits in pit 547008. Most of the struck flints (38 pieces) came from the upper deposit, context 547001. The assemblage is in fresh condition and consists mainly of unretouched flakes, some of which have been utilised. Of particular note is an exceptionally large flake of chalk flint, which is of a remarkably similar flint type to that used for the manufacture of the polished axe from WPR 98 (**ILL. 9**).

Preparatory flakes (seven pieces) and unclassifiable waste (13 pieces) are common, and indicate the likely presence of some knapping waste. A small number of flake cores (three pieces) were also recovered, which have been systematically reduced using a hard percussor with little or no platform preparation. Several pieces of a similar flint type were noted, although no refits were found.

Technologically, the assemblage appears to be of mixed character and the condition is somewhat variable. The majority probably dates to the middle or late Bronze Age, although there seems to be a number of residual pieces present that could be considerably earlier, including the blade from context 547002 and the bladelike flake from context 547001.

GAI 99: pit 216063

A total of 66 struck flints and 27 pieces (650g) of burnt unworked flint were recovered from two deposits within pit 216063. The flintwork is in fresh condition and forms a coherent, Late Bronze Age assemblage, containing high proportions of squat hard-hammer flakes. Several flake cores (six pieces) and a small quantity of chips (ten pieces) were also recovered. Two pairs of refitting flakes indicate the likely presence of some *in situ* knapping waste, while the presence of five scrapers might suggest a specialised aspect to the retouched component.

WPR 98: area A8, pit 148042

A total of 19 struck flints and 671 pieces (2300g) of burnt unworked flint were recovered from four deposits within this feature. The flintwork is in a reasonably fresh

condition and probably dates to the later Bronze Age. The assemblage is dominated by chips (four pieces) and flakes (11 pieces), including one of bullhead flint. Three retouched flakes were also recovered, along with one end scraper. The latter is in a poor condition and is probably residual; the quality of the retouch suggests an Early Bronze Age date for the piece.

WPR 98: area R2, waterhole 157065

A total of 15 struck flints in reasonably fresh condition were recovered from three deposits (157066, 157067 and 157074) within the waterhole on WPR 98. A further 2493 pieces (8238g) of burnt unworked flint were also retrieved from five deposits within the feature. The volume of burnt unworked flint suggests that the waterhole was used for a specialised, perhaps industrial, function.

The struck flint assemblage seems to combine Late Bronze Age flintwork, such as the crudely-made scraper on a non-flake blank, with a number of residual pieces. These residual pieces have been isolated on technological grounds and can be dated broadly to the Neolithic or earlier Bronze Age. Possible examples include the retouched flake and the serrated flake.

None of the struck flint assemblage has been burnt, which suggests that it was not originally associated with the burnt unworked flint component and may have been independently included in the deposit.

PSH 02: area 42a, ditch 555348

A total of 72 struck flints and one piece (26g) of burnt unworked flint were recovered from the main deposit, 559158, within ditch intervention 555348. The assemblage is in very fresh condition and consists of large quantities of unclassifiable waste from a limited number of cores that can be dated to the later Bronze Age on technological grounds. There is very little in the way of utilised pieces and retouched tools, suggesting that the assemblage is composed entirely of knapping debitage. Only one struck flint has been burnt.

The results of the refitting analysis also suggest a dump of knapping waste. It was established that almost all the flints in the assemblage derive from three, possibly four, original nodules; only seven pieces could not be assigned to a related group. Each nodule is represented by one or more series of refits involving up to 12 pieces and representing all stages of the reduction sequence. While none of the nodules could

be completely reconstructed, it seems that the missing elements were probably not removed for use as, where it could be determined, all were of angular, irregular form; these absent pieces may have been missed by the excavated section.

The flintwork is typical of a later Bronze Age industry, involving hard-hammer percussion and little or no platform preparation. The local nodules that were used contain numerous flaws and inclusions that may, to a large extent, explain the quantity of unclassifiable waste in the assemblage (38 pieces). In terms of technology and composition, the assemblage is very similar to that from ditch 535001 (PSH 02, area 49; see below) and may have been deposited around the same time and in similar circumstances.

PSH 02: area 49, ditch 535001

Most of these 37 struck flints can be refitted to form two nodules of gravel flint, which are composed of flakes and pieces of unclassifiable waste. The assemblage represents an *in situ* knapping scatter, complete with stone hammer (see stone report), and probably dates to the Late Bronze Age. No retouched tools or utilised flints were noted.

The nodules have been unsystematically reduced from several cortical platforms using a hard hammer, probably the same one that was deposited with the flintwork. There is little evidence of platform preparation prior to removal. One of the nodules can be fully reconstructed; the other is approximately three quarters complete. The missing elements from the incomplete nodule appear to be irregular pieces of shatter, which were unlikely to have been selected for use and may instead have been missed during excavation. That neither nodule seems to have yielded any useable flakes suggests that the ditch was used to deposit tested (and rejected) nodules, although the possibility that it was the act of reduction that was an end rather than a means, in the context of deliberate or structured deposition, is not ruled out (c.f. Brown 1991, 104-6).

PSH 02: area 58, pit 639072

A total of 146 struck flints were recovered from a single deposit (639063) within pit recut 639072. The assemblage is in an exceptionally fresh condition and consists mainly of large, angular pieces of shatter and irregular flakes. Retouched tools are

very limited in number, and include a broken piercer. Evidence of light burning was noted on several pieces.

The assemblage appears to consist of an *in situ* Late Bronze Age knapping dump. The flintwork represents an industry reliant on hard-hammer percussion with little or no platform preparation. Most of the flakes consist of irregular, angular removals; pieces of unclassifiable shatter are common (43 pieces). Many pieces are broken (74 pieces), and the complete pieces used in the metrical analysis show dramatic variation in size. Many of the platforms are crushed or broken, and evidence from bulb morphology along with the frequency of hinge- and step-terminated flakes suggest that the removals were taken with unnecessary force; this might suggest the work of an inexperienced or unskilled knapper.

Most of the material seems to derive from the reduction of approximately five nodules. One is of a particularly distinctive flint type, which is light pinkish-grey in colour with large, white cherty inclusions; this group contained the largest number of refits and related pieces. Another related group was characterised by an unusually high proportion of burnt pieces and contained several conjoining flints. No long refitting sequences were found in any of the groups, however, suggesting that elements have been removed from the scatter. Utilised edges were noted very occasionally, but the generally low incidence of retouch and use-wear might suggest that the missing elements were the ones intended for use. The only retouched piece, a piercer, was among the few flints that could not be assigned to one of the five related groups and may have been introduced to the scatter from elsewhere.

PSH 02: area 77, waterhole 581168

An assemblage of 57 struck flints in fresh condition was recovered from seven deposits within this feature. The largest quantity of flint, a combined total of 46 pieces, came from contexts 581169 and 581170; the latter deposit also produced a substantial assemblage of Late Bronze Age flint-tempered pottery and a copper alloy ring. The flintwork is technologically consistent with the date provided by the pottery and appears to represent a mixed deposit of utilised flints and knapping waste.

The assemblage is dominated by flakes (38 pieces) but includes several flake cores (four pieces), partially worked nodules (two pieces) and unclassifiable waste (six pieces) that imply the presence of some knapping waste. Several retouched tools were

recovered, including one scraper, two notched pieces and one spurred piece; many more unretouched edges displayed use-wear.

The waterhole also contained 433 pieces (7898g) of burnt unworked flint, which may relate to its particular function. Dumps of burnt unworked flint in waterholes are known from elsewhere at Heathrow, such as the example from WPR 98 (area R2, waterhole 157065), and the common association suggests a widespread practice, industrial or otherwise.

Discussion

From the Middle and later Bronze Age, *in situ* flint assemblages start appearing in greater numbers and in a wider range of discrete cut features, including pits, ditches, tree-throw holes and waterholes. These assemblages vary in character from knapping scatters and surface spreads, to general domestic accumulations and more formalised deposits, such as the near-complete knapping scatters from ditch contexts (e.g. PSH 02 area 42a, 555348 and area 49, ditch 535001). Waterholes also seem to have attracted 'special' deposits of flintwork, often accompanying other unusual finds, such as the red deer antler from waterhole 559665 (PSH 02 area 99).

Late Bronze Age lithic assemblages are fairly common in the region, and most if not all appear to consist of simple, unstructured disposals of debitage and a very limited range of tools (for instance Holloway and Sipson Lanes (MoLAS 1993); Imperial College: Gardiner nd; RMC land, Harlington: Leivers 2006; Harefield Road, Uxbridge: Barclay *et al.*, 1995).

Appendix I: Categories used for the classification of the struck flint assemblage.

	Category:	Sub-category:
Debitage	Flake/broken flake	Primary flake Secondary flake Tertiary flake Levallois flake Flake from a polished implement Unclassifiable waste
	Blade/broken blade	Blade Bladelet bladelike flake
	Core preparation flake	Core face/edge rejuvenation flake Rejuvenation flake tablet Crested blade
	Axe/adze sharpening flake	Axe/adze thinning flake
	Burin spall	Burin spall
	Microburin	Microburin
	Chip/sieved chip	Chip Sieved chip
Cores	Core/core fragment	Single platform flake core Multi-platform flake core Levallois/other discoidal flake core Keeled core Single platform blade core Opposed platform blade core Multi-platform blade core Unclassifiable blade core Core on a flake Unclassifiable core
	Nodule	Partially worked nodule
Retouched tools	Retouched blade/flake	Retouched flake Retouched blade(let) Unclassifiable retouch
	Scraper	End scraper Side scraper End-and-side scraper Disc scraper Thumbnail scraper Unclassifiable scraper
	Knife	Backed knife Scale-flaked knife Unclassifiable knife
	Microlith/backed bladelet	Microlith
	Serrate/denticulate	Serrated piece Denticulate Notched piece
	Piercer	Awl/piercer Spurred piece Burin
	Fabricator	Fabricator
	Arrowhead	Laurel leaf

		Leaf-shaped Chisel Oblique Barbed-and-tanged Unfinished arrowhead Unclassifiable arrowhead
	Axe/core tool	Flaked axe Polished axe
Other	Hammerstone	Flint hammerstone
	Unclassifiable	Natural

Appendix II: Catalogue of illustrated flint (Fig. 1)

ILL	Object number:	Object:	Site code:	Site name:	Area:	Feature:	Cut:	Deposit:	Description:
1	3531	Handaxe	WPR 98	Perry Oaks Drying Beds	_	Topsoil	_	100000	Heavily rolled and iron-stained. Found in a land drain.
2	15658	Levallois flake	PSH 02	Terminal 5	61	Waterhole	516082	522016	Heavily rolled and iron-stained. Recent distal break.
3	4019	End scraper	GAI 99	Northern Taxiway	1B	Ditch	214003	214009	End' scraper made on elongated thermal blank. Iron-stained.
4	16397	Microlith	PSH 02	Terminal 5	49	Ditch	515196	515197	Inversely retouched microlith, similar to Jacobi's type 12c (Jacobi 1979, 16, figure 6). Abrupt crossed retouch on right-hand edge. Iron-stained. Use-wear.
5	17697	Burin	PSH 02	Terminal 5	15	Alluvial layer within ditch	559495	559504	Proximal burin removal. Use-wear. Slight distal break.
6	212	Leaf-shaped arrowhead	WPR 98	Perry Oaks Drying Beds	A6	Tree-throw hole	180045	180046	Leaf shaped arrowhead, missing distal tip. Similar to Green's type 3C (v) (Green 1980, 71, fig. 28).
7	14046	Leaf-shaped arrowhead	PSH 02	Terminal 5	34	Ditch	594129	594130	Probable leaf-shaped arrowhead tip. Covering invasive bifacial retouch. Incomplete, but similar to Green's type 3B (Green 1980).
8	19088	Flake from partially-polished axe	PSH 02	Terminal 5	58	Ditch	674014	674015	Plunging flake removing butt end of partially-polished flaked axe. Incomplete.
9	1853 & 2307	Polished axe fragment with indirectly refitting flake.	WPR 98	Perry Oaks Drying Beds	C4	Pit	129091 & 129106	129092 & 129107	Fragment of Neolithic polished axe, repaired and reground before used as core; flake 2307 from deposit 129107 refits.
10	14004	Barbed-and-tanged arrowhead	PSH 02	Terminal 5	49	Western cursus ditch	605001	605002	Finely retouched barbed-and-tanged arrowhead. Iron-stained flint, probably non-local. Similar to Green's type C K (Green, 1980).
11	14045	Partially-polished knife	PSH 02	Terminal 5	72	Ditch	594095	594096	Small leaf-shaped knife with partial dorsal polish. Covering retouch on dorsal surface, partial on ventral (ends only). Honey-coloured flint, probably of a non-local source. Slight break to tip.
12	19	Chisel arrowhead	WPR 98	Perry Oaks Drying Beds	A3	Ditch	149021	149022	Some possible use-wear / impact damage to tranchet edge. Similar to Green's type e (Green 1980, 101, fig. 37).
13	15583	Chisel arrowhead	PSH 02	Terminal 5	77	Waterhole	510047	562038	Finely made on Levallois flake.
14	16252	Chisel arrowhead	PSH 02	Terminal 5	72	Tree-throw hole	579156	579158	Large, hooked chisel arrowhead made on Levallois flake. Probable impact damage on tranchet edge. Similar to Green's type d (Green 1980, 101, Fig. 37).
15	8165	Outsize' chisel arrowhead	PSH 02	Terminal 5	99	Pit	555941	555942	Outsize 'chisel arrowhead', function unknown. Made transversely on thick, hinged flake. Heavy use-wear on tranchet edge.
16	12039	Oblique arrowhead	PSH 02	Terminal 5	49	Subsoil	502002	502002	Oblique arrowhead made on thin flake. Red-coloured flint. Similar to Green's type e (Green 1980, 102, Fig. 38).
17	3532	Oblique arrowhead	WPR 98	Perry Oaks Drying Beds	_	Topsoil	_	100000	Roughly-made oblique arrowhead, extremes of tip and tang missing. Similar to Green's type f (Green 1980, 102, Fig. 38).
18	890	Levallois core	WPR 98	Perry Oaks Drying Beds	A8	Pit	127021	127016	Probably hard-hammer reduced, limited platform edge abrasion in places. 52 g.
19	712	End-and-side scraper	WPR 98	Perry Oaks Drying Beds	A6	Tree-throw hole	125108	125109	Retouched on preparatory flake with proximal break. Use-wear.
20	17646	Thumbnail scraper	PSH 02	Terminal 5	28	Posthole	543263	543265	Minimally retouched.
21	14003	Backed knife	PSH 02	Terminal 5	49	Ditch	543172	543174	Heavy rounded use-wear on right-hand edge; use-wear and gloss on left-hand edge.
22	16036	End-and-side scraper	PSH 02	Terminal 5	49	Pit	527124	527113	Chalk flint.
23	16793	Piercer	PSH 02	Terminal 5	49	Hedgerow	527115	527116	Robust piercing point on thermal blank. Use-wear.
24	14011	Serrated blade	PSH 02	Terminal 5	72	Pit	579172	579177	Serrations and ventral gloss on both lateral edges.
25	15581	End scraper	PSH 02	Terminal 5	77	Waterhole	510047	562037	Finely retouched on broad, plunging tertiary flake. Heavy use-wear. Honey-coloured flint. Incomplete.
26	699	Serrated flake	WPR 98	Perry Oaks Drying Beds		Tree throw	156191	148109	Serrations on left margin
27	1431	Oblique arrowhead	WPR 98	Perry Oaks Drying Beds	-	Toposil	-	100000	Oblique arrowhead on thin flake.
28	29033	Polished axe fragment	TEC 05	Concourse C		Pit	814081	814086	
29	33001	Oblique arrowhead	TEC 05	Concourse C		Posthole	825007	825008	
30	-	Scraper/knife	TEC 05	Concourse C		Pit	827269	827270	Group, including scraper/knife, broken scrapers, serrate, debitage
31	-	Scraper/knife	TEC 05	Concourse C		Pit	827269	827271	Group, including scraper/knife, core fragments, debitage

References

Allen, M J and Gardiner, J 2002 A Sense of Time: Cultural Markers in the Mesolithic of Southern England? In B. David and M Wilson (eds) *Inscribed Landscapes Marking and Making Place*. Honolulu: University of Hawai'i Press, 139-53

Allen, T, Barclay, A, Lamdin-Whymark, H, 2004 Opening the wood, making the land: the study of a Neolithic landscape in the Dorney area of the Middle Thames Valley in Cotton, J, and Field, D (eds.), *Towards a New Stone Age*, CBA Research Report 137, CBA, York, 82-98

Barclay, A, Boyle, A, Bradley, P and Roberts, M R, 1995 Excavations at the former Jewsons Yard, Harefield Road, Uxbridge, Middlesex. *Trans. Lond. Middlesex Arch. Soc.* **46**, 1-25

Bamford, H M, 1985 *Briar Hill excavation 1974-1978*, Northampton Development Corporation Archaeol Mono **3**, Northampton

Bradley P, and Cramp, K forthcoming. The Flint in G. Hey (ed.), *Yarnton: Neolithic and Bronze Age settlement and landscapes*, Thames Valley Landscape Monograph

Brown, A 1991 Structured deposition and technological change among the flaked stone artefacts from Cranborne Chase in J. Barrett, R. Bradley and M. Hall (eds.), *Papers on the prehistoric archaeology of Cranborne Chase*, Oxbow Monograph 11, Oxford

Brown, N and Cotton, J, 2000 The Bronze Age, in *The Archaeology of Greater London*. London: Museum of London Archaeology Service, 82-93

Collins, D 1978 *Early Man in West Middlesex*. London: HMSO

Cotterell, B and Kamminga, J, 1987 The formation of flakes *American Antiquity* **52**, 675-708

Cotton, J 1990a Finds from the Cursus Ditches, in M. O'Connell 1990, 28.

Cotton, J 1990b Excavations and Observations in Moor Lane, Harmondsworth, Middlesex, 1982, in M. O'Connell 1990, 29-32.

Cotton, J 1993 Neolithic Flintwork, in W. F. Grimes and J. Close-Brooks *The Excavation of Caesar's Camp, Heathrow, Harmondsworth, Middlesex, 1944*. *Proc. Prehist. Soc.* **59**, 303-60

Cotton, J, Elsden, N, Pipe, A and Rayner, L, 2006 Taming the Wild: A Final Neolithic/Earlier Bronze Age Aurochs Deposit from West London, in D. Serjeantson and D. Field (eds) *Animals in the Neolithic of Britain and Europe*. Oxford: Oxbow Books [=Neolithic Studies Group Seminar Papers 7], 149-67

Cotton, J, Mills, J and Clegg, G, 1996 *Archaeology in West Middlesex the London Borough of Hillingdon from the earliest hunters to the late medieval period.* Hillingdon Borough Libraries.

Cramp, K, with Case, H and Nimmo, K 2007 The flint in D. Benson and A. Whittle (eds.), *Building memories: the Neolithic Cotswold long barrow at Ascott-under-Wychwood, Oxfordshire*, Oxbow Books for English Heritage, 289-314

Dewey, H, and Bromehead, C E N, 1915 *The Geology of the country around Windsor and Chertsey*, London, Mem. Geol. Survey, HMSO

Drew, C D and Piggott, S, 1936 The Excavation of Long Barrow 163a on Thickthorn Down, Dorset *Proc. Prehist. Soc.* **2**, 77-96

Elsden, N J, 1997 Excavations at Nobel Drive, Harlington, and six sites to the north of Heathrow Airport, Hillingdon. *Trans. Lond. Middlesex Arch. Soc* **48**, 1-14

Evans, C, Pollard, J and Knight, M 1999 Life in woods: Tree-throws, 'settlement' and forest cognition *Oxford Journal of Archaeology*, **18**, 241-54

Ford, S, 1987 Chronological and functional aspects of flint assemblages in *Lithic analysis and later British Prehistory* in A. Brown and M. Edmonds (eds.) BAR British Series **162**, 67-81

Ford, S and Pine, J 2003 Neolithic Ring Ditches and Roman Landscape Features at Horton, in S. Preston (ed) *Prehistoric, Roman and Saxon Sites in Eastern Berkshire*. Reading: Thames Valley Archaeological Services Monograph 2, 12-85

Gardiner, J, nd Imperial College Phase 1: Notes on the worked flint. Unpublished client report.

Green, H S, 1974. Early Bronze Age burial, territory and population in Milton Keynes, Buckinghamshire, and the Great Ouse Valley. *Archaeol J* **131**, 75-139

Green, H S, 1980 *The flint arrowheads of the British Isles*. BAR British Series **75(I)**

Harding, P, 1990 The comparative analysis of four stratified flint assemblages and a knapping cluster, in J. Richards *The Stonehenge Environs Project* London: HMSO. English Heritage Archaeological Report no 16, 213-25

Harding, P, 1999 Worked Flint, in D E Farwell, P Andrews and R Brook *Prehsitoric, Roman, and Early Saxon Settlement at Prospect Park, London Borough of Hillingdon*. Salisbury: Wessex Archaeology for British Airways, 28-9

Healey, E and Robertson-Mackay, R, 1987 The Flint Industry, in R. Robertson-Mackay *The Neolithic Causewayed Enclosure at Staines, Surrey: Excavations 1961-63. Proc. Prehist. Soc.* **53**, 23-128

Healy, F, 1988 *The Anglo-Saxon cemetery at Spong Hill, North Elmham, part VI: occupation during the seventh to second millennia BC*, E Anglian Archaeol **39**, Gressenhall

Healy, F, 2004 Hambledon Hill and its Implications, in *Monuments and Material Culture papers in honour of an Avebury archaeologist: Isobel Smith*. Salisbury, Hobnob Press, 15-38

Inizan M-L, Roche H, Tixier J, 1992 *The Technology of Knapped Stone*, Meudon: CREP

Jacobi, R, 1978 The Mesolithic of Sussex, in *Archaeology in Sussex to AD 1500* (P L Drewett ed) CBA Res Rep **29**, 15-22

Jones, P and Ayres, K, 2004 A bone 'scoop' and Grooved Ware vessel from a pit in the Lower Colne Valley, Surrey, in Cotton, J, and Field, D (eds.), *Towards a New Stone Age*, CBA Research Report 137, CBA, York, 148-53

Lacaille, A D 1937 Prehistoric pottery found at Iver, Bucks. *Rec. Bucks.* **13**, 287-99

Leivers, M 2005 The Flint, in Wessex Archaeology 2005 *Kingsmead Quarry, Horton*

Berkshire Extraction Phases 4-7 Post-excavation Assessment Report with Updated Project Design for Analysis and Publication. Salisbury: Wessex Archaeology, 17-20

Leivers, M 2006 *Worked flint from RMC land, Harlington*. Unpublished client report.

Lewis, J S C 1991 Excavation of a Late Glacial and Early Flandrian site at Three Ways Wharf, Uxbridge: interim repor', in R. N. E. Barton, A. J. Roberts and D. A. Roe (eds) *The Late Glacial in north-west Europe*, 246-55. London: Council for British Archaeology [=CBA Research Report No 77]

Lewis, J S C 2000a The Lower Palaeolithic Period, in *The Archaeology of Greater London*. London: Museum of London Archaeology Service, 30-38

Lewis, J S C 2000b The Neolithic Period, in *The Archaeology of Greater London*. London: Museum of London Archaeology Service, 64-75

Lewis, J S C forthcoming An Earlier Upper Palaeolithic Site at Heathrow, West London

Merriman, N 1990 *Prehistoric London*. London: HMSO

MoLAS 1993 *The Developing Landscape of West London Settlement, Economy and Environment on the Thames Gravels in the Prehistoric and Roman Periods Post Excavation Assessment Report & Updated Project Design*. Museum of London Archaeology Service unpublished typescript,

Needham, S P, 1989 *British Museum Excavations at Runnymede Bridge Summary of the final season, 1989*. Unpublished typescript.

Newcomer, M H and Karlin, C, 1987 Flint chips from Pincevent, in *The human uses of flint and chert: papers from the fourth international flint symposium* (eds G de G Sieveking and M H Newcomer), 33-6, Cambridge University Press

O'Connell, M, 1990 Excavations during 1979-1985 of a multi-period site at Stanwell. *Surrey Arch. Colls* **80**, 1-62

Ohnuma, K and Bergman, C, 1983 Experimental Studies in the Determination of Flaking Mode *Bulletin of the Institute of Archaeology*, **19** (1982), 161-170

Pitts, M W, and Jacobi, R M, 1979 Some aspects of change in flaked stone industries of the Mesolithic and Neolithic in southern Britain, *J. Archaeol. Sci.* **6 (2)**, 163-177

Robertson-Mackay, R., 1987: 'The Neolithic Causewayed Enclosure at Staines, Surrey: excavations 1961-63'. *Proc. Prehist. Soc.* **53**, 23-128.

Saville, A, 1980 On the measurement of struck flakes and flake tools, *Lithics* **1**: 16-20

Saville, A, 1981 *Grimes Graves, Norfolk. Excavations 1971-72. Vol. 2: the flint assemblage*. London. HMSO

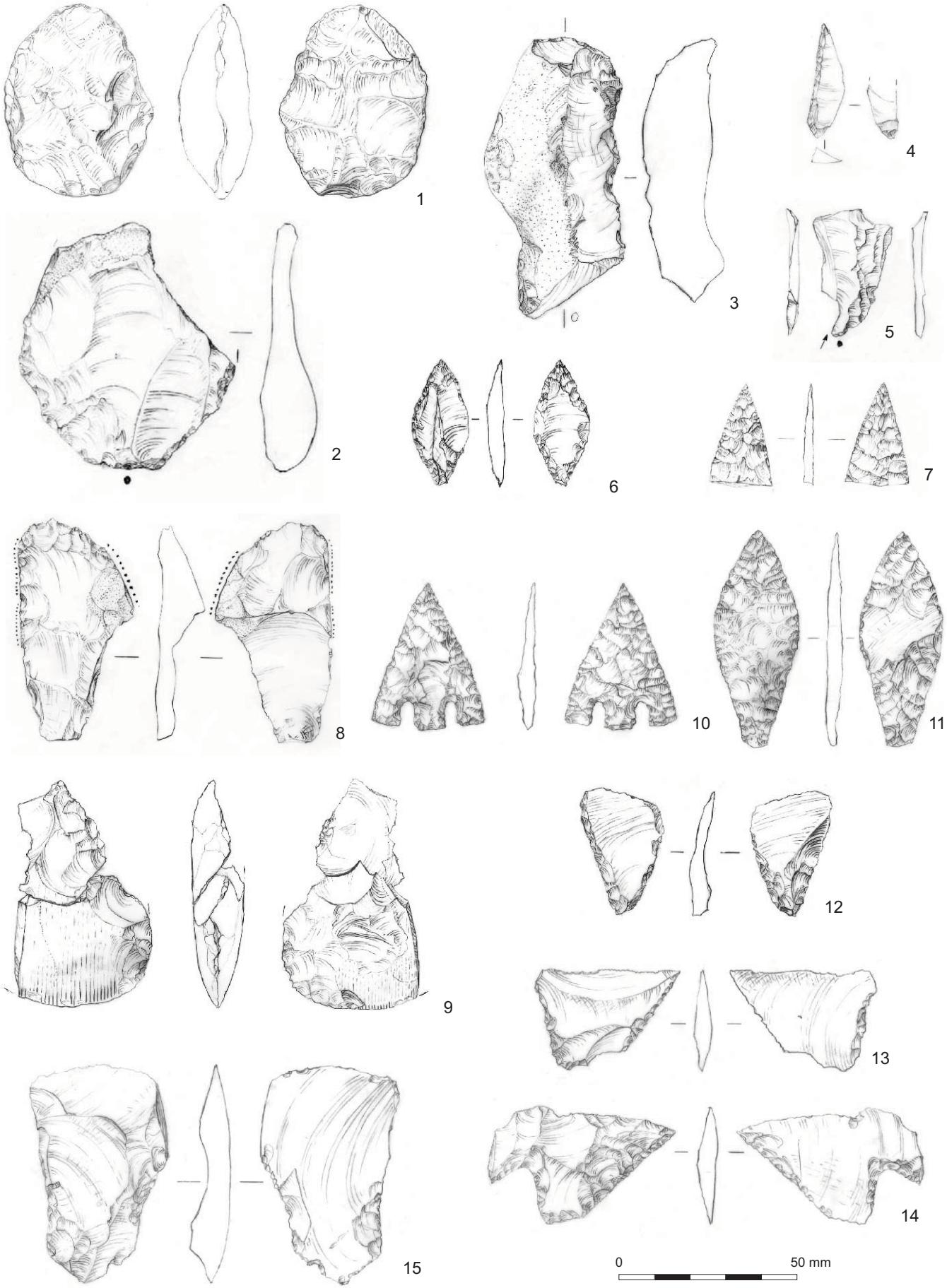
Shepherd, W, 1972 *Flint. Its origin, properties and uses*, London, Faber and Faber

Tixier, J, Inizan, M-L and Roche, H, 1980 *Préhistoire de la pieree taillée I. terminologie et technologie*. Paris: CREP.

Wymer, J 1968 *Lower Palaeolithic Archaeology in Britain*. London: John Baker

Wymer, J 1991 The Lower Palaeolithic Period in the London Region, *Trans. London & Middlesex Arch. Soc.* **42**, 1-15

Young, R and Humphrey, J 1999 Flint use in England after the Bronze Age: time for a re-evaluation? *Proc Preh Soc* **65**, 231-42



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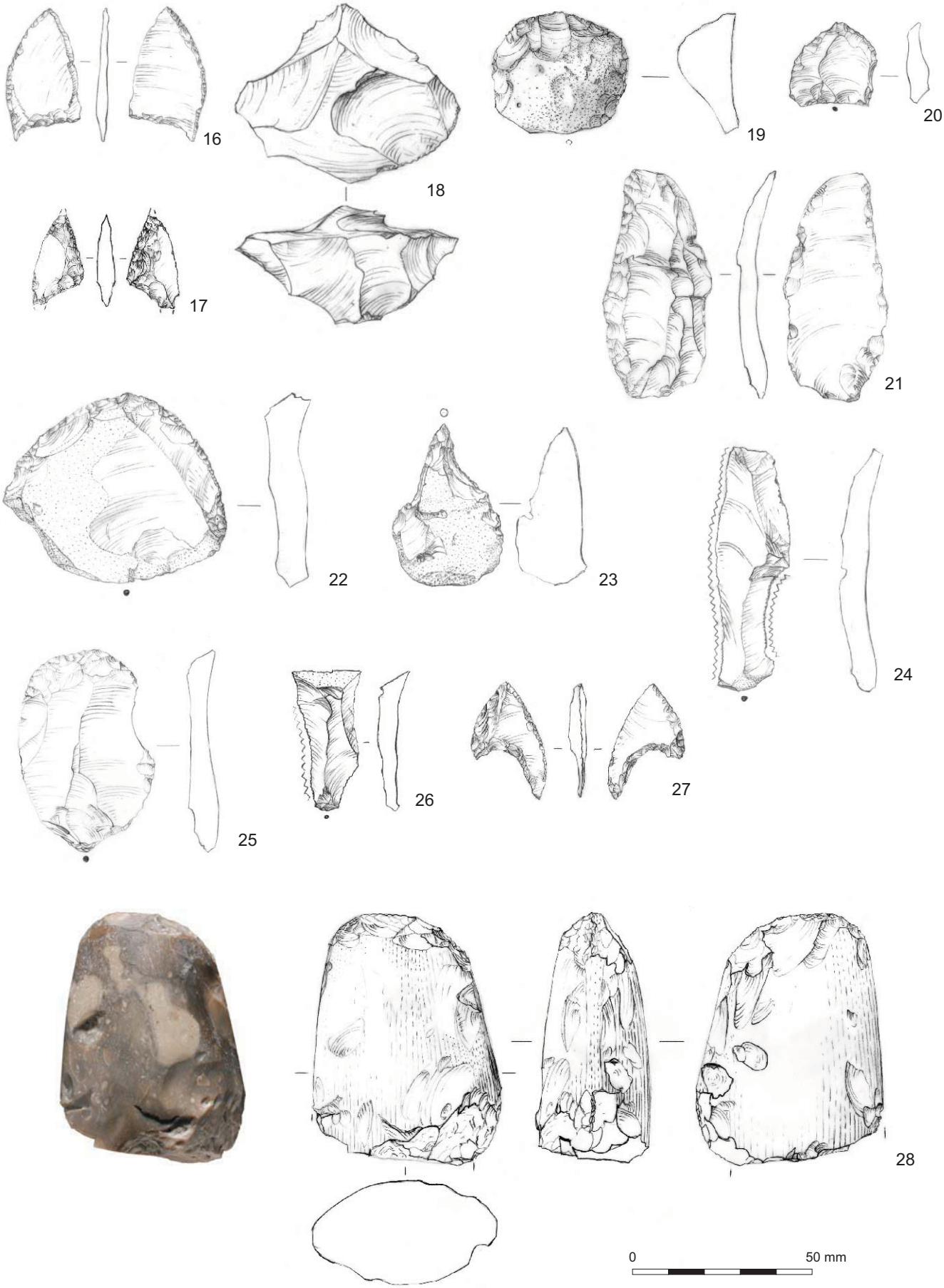

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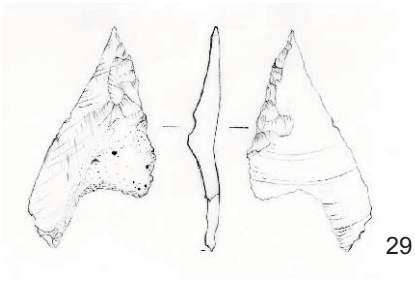

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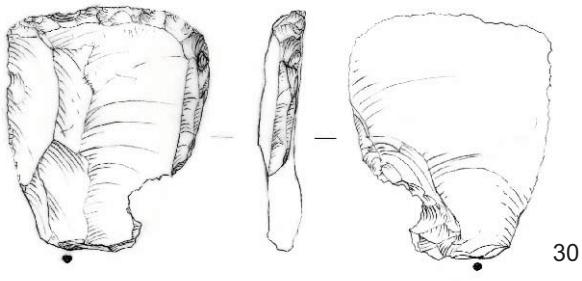

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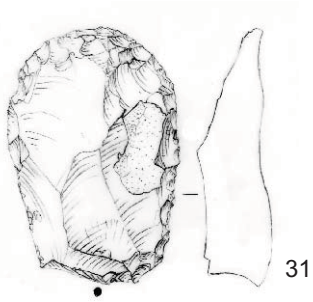

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