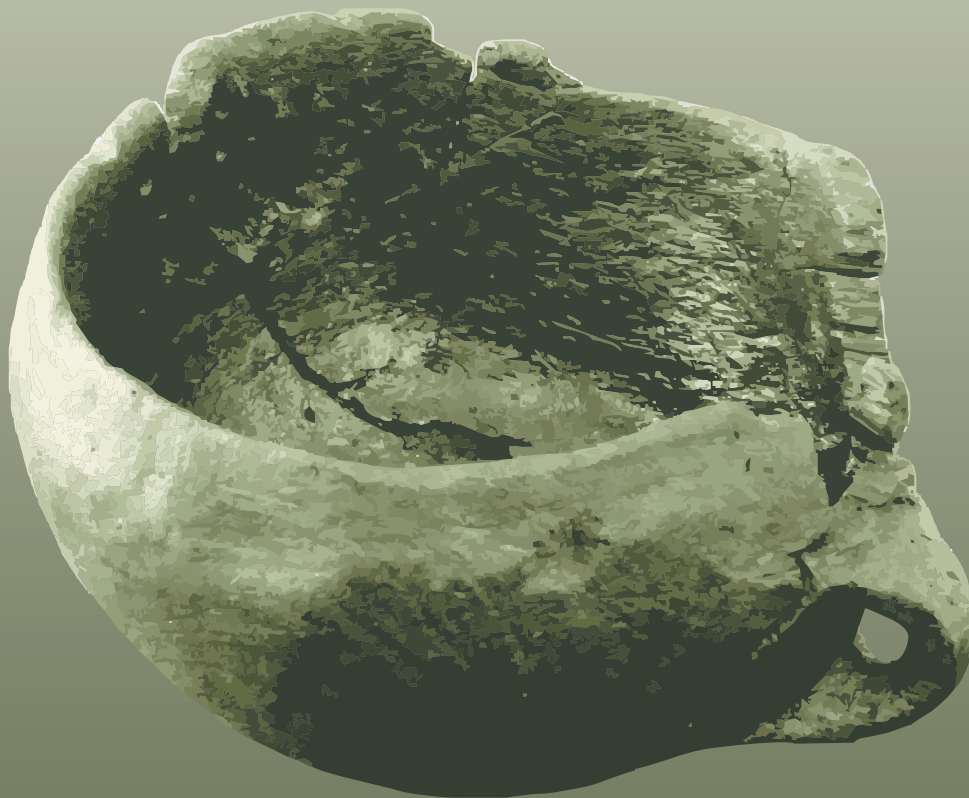


Landscape Evolution in the Middle Thames Valley
Heathrow Terminal 5 Excavations Volume 2

Woodworking Technology

(Section 11)



by Steven J Allen

SECTION 11

WOODWORKING TECHNOLOGY

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Introduction

Following on from study of the Perry Oaks Sludge Works wood assemblage (WPR98) (Allen 2006), the author was asked to look at the wood recovered from subsequent excavations in the vicinity (PSH 02, TEC05 and LFA05). These were conducted in advance of construction work for the new Terminal 5 at Heathrow Airport, Middlesex on behalf of BAA.

Methodology

The author was invited to visit the site in May of 2003 to see work in progress and to advise on any packaging and sampling issues which had arisen. Following the end of this phase of the fieldwork, the wood was collected together and brought to York for recording in April 2004. This was recorded and assessed, the records being placed into a Microsoft Access database for analysis. Further wood from the ‘Twin Rivers’ (PSH02), TEC05 and LFA05 parts of the project were brought to York in September 2005 and again recorded and assessed.

Analysis of the records was delayed partly by reported numbering problems with the site records and partly by a change to the computers in the conservation department which removed, and did not replace, Microsoft Access for some time. Copies of the wood record sheets assigned to the assemblage were also made available. As far as is known, no material was discarded on site or before delivery to Oxford Archaeology (OA) stores.

The artefacts from the assemblage had been individually packed in polythene bags further wrapped in black polythene sheeting and secured with adhesive tape, with support and padding where necessary. The bowl had been lifted but not emptied or cleaned owing to its extreme fragility. Samples and several of the structural pieces such as the upright stakes had been wrapped or bagged on site, usually in self sealing polythene bags, but had not generally been cleaned. The overall condition of the wood was fair, some pieces being very well preserved, others, especially smaller pieces of roundwood, were degraded.

Records were produced in the form of hand written notes with annotated sketches where required. This additional recording was necessary to recover information about woodworking technology, condition and form which had not generally been included on the various wood record sheets used in the field.

Sampling for species identification was carried out on all artefacts on an individual basis. Each sample was examined in transverse, radial longitudinal and tangential longitudinal sections under a microscope at x40, x100 and x250 magnification; all species identifications follow Schweingruber (1982). All identifications carried out in this way are incorporated into the database using their scientific names.

Species and Common Names. Most of the wood can only be identified to a particular genera. Although, for example, there are many different species of willow, their wood cannot be differentiated. The following list gives the common names of the scientific identifications used in this report and the database.

<i>Acer campestre L.</i>	Field Maple
<i>Alnus spp.</i>	Alder
<i>Castanea sativa Gaertn.</i>	Sweet Chestnut
<i>Corylus avellana L.</i>	Hazel
<i>Fagus sylvatica L.</i>	Beech
<i>Frangula alnus Mill.</i>	Alder Buckthorn
<i>Fraxinus excelsior L.</i>	Ash
<i>Pomoideae spp.</i>	includes Apple, Pear, Hawthorn, Quince.
<i>Populus sp.</i>	Aspen, White or Black Poplar

<i>Prunus spp.</i>	includes Cherry (<i>P. avium</i>), Blackthorn (<i>P. spinosa</i>)
<i>Quercus spp.</i>	Oak
<i>Salix spp.</i>	Willows
<i>Ulmus spp.</i>	Elms

Summary of assemblages (see database in archive for detailed records).

Wood was recovered from a number of negative features, interpreted as ditches, pits and water holes. In all cases, the wood had survived through burial in waterlogged anoxic conditions, maintained from burial through to excavation. The following report is divided into sections by the features from which wood was recovered. Dating is based on the information provided by the Framework Archaeology Assessment Level Free Viewer CD (distributed with Project Design Update Note 2, November 2005).

Late Neolithic/Early Bronze Age (PSH02 feature SG 663047):

SG 663047. Pit fill includes one quartered fragment of *Fagus sylvatica* L. The conversion indicates this piece of wood was worked but no toolmarks or further shaping were evident.

Bronze Age (feature SG 568142):

SG 568142. Secondary fill of ditch with two *Quercus spp.* stake points and section of *Quercus spp.* roundwood.

Early/Middle Bronze Age (PSH02 feature SG 547007):

SG 547007. Waterhole revetted with two crude stakes (one *Acer campestre*, one *Betula pendula* L.) cut from branch wood. One *Quercus spp.* heartwood chipping, one section of unidentifiable roundwood (?*Castanea sativa* L.)

Middle Bronze Age (PSH 02 features SG 510047, SG 551006, SG 559328, SG 568092, SG 578501, SG 580035, SG 615008; LFA05 features SG 698028, SG 711024; TEC05 feature SG 708014):

SG 510047. Fill of waterhole with one substantial *Salix spp.* stake point and two chippings, one of *Quercus spp.* heartwood, the other of unidentifiable bark.

SG 551006. Tertiary fill of waterhole contains a *Quercus spp.* stake point and a section of *Quercus spp.* roundwood, possibly the upper part of the stake.

SG 559328. Waterhole whose secondary fill produced a single crushed fragment of *Alnus spp.* roundwood.

SG 568092. Waterhole whose secondary fill produced a section of *Salix spp.* roundwood.

SG 578501. Heartwood chipping of *Quercus spp.* burr wood in secondary fill of waterhole.

SG 580035. Backfill of pit produced several *Quercus spp.* heartwood chippings, four bark chippings, an *Alnus spp.* sapwood chipping, a piece of *Alnus spp.* roundwood and a piece of charred *Corylus avellana L.* roundwood.

SG 615008. Primary fill of pit produced a *Fraxinus excelsior L.* stake point, two *Quercus spp.* heartwood chippings which might once have been a stake, and an *Alnus spp.* log ladder (SF24001)

SG 698028. Wattle revetment of waterhole consisting of three *Quercus spp.* staves, eight stake points (five *Fraxinus excelsior L.*, two *Quercus* and one *Salix spp.*), seven sections of *Salix spp.* roundwood, two of *Fraxinus excelsior L.*, two of *Quercus spp.* and a bag of seventy nine roundwood fragments (not analysed).

SG 711024. Morticed *Quercus spp.* timber SF 28916

SG 708014. Waterhole whose primary fill contained thirteen unidentifiable bark chippings. Two *Salix spp.* heartwood chippings, twenty five bark chippings (not identifiable), nine *Salix spp.* bast fragments, two sections of small diameter roundwood (one *Quercus spp.*, one paper record only) and a possible *Salix spp.* bark container in thirty five fragments came from the secondary fill.

Middle/Late Bronze Age (PSH02 features SG 553181, SG 611107; TEC 05 features SG 685032, SG 687006, SG 687011):

SG 553181. Waterhole with one section of roundwood (?stake- paper record only) and a *Fraxinus excelsior* L. spike (SF13260) from the revetment. Seven sections of small diameter roundwood (two *Quercus* spp., one each of *Acer campestre* L., *Corylus avellana* L., *Fraxinus excelsior* L., *Prunus avium* L. and one more recorded on paper only) and eleven chippings of bark from a *Pomoideae* spp.

SG 611107. Fill of recut of waterhole produced one section of *Corylus avellana* L. and one section of *Quercus* spp. roundwood, an unidentifiable root, a *Quercus* spp. heartwood chipping, and a carved bowl (SF 12045) cut from *Populus* spp. Part of an *Alnus* spp. board and some unidentified fibrous material was found in the secondary fill of this recut.

SG 685032. Two parts of the same *Quercus* spp. log ladder (SF 29725) from fill of waterhole.

SG 687011. Five stake points of which two recorded on paper only, two *Salix* spp. and one *Quercus* spp. One *Fraxinus excelsior* L. roundwood section, partially charred, one *Quercus* spp. offcut and nine sections of board (one *Fraxinus excelsior* L., two *Quercus* spp., one *Acer campestre* L., all radially faced, five with incomplete paper records only) all from revetment of waterhole.

SG 687006. Primary fill of pit produced thirty eight unidentifiable bark chippings, (thirty seven unidentifiable, one paper record only), twenty three fragments of a ?*Salix* spp. “Bark Container” (SF 29516), six stake points (one *Acer campestre* L., one *Salix* spp., four paper record only), seven sections of roundwood (one *Quercus* spp., one *Fraxinus excelsior* L., five paper record only) and three board fragments (one *Quercus* spp., two paper record only).

Late Bronze Age (PSH02 features SG 517310, SG 546171, SG 563060, SG 568236, SG 636112):

SG 517310. The earliest fill of this recut waterhole contains three stake points (two *Salix* spp., one *Pomoideae* spp.), three small roundwood fragments (one each of *Alnus*

spp., *Corylus avellana* L. and *Fraxinus excelsior* L.), *Salix spp.* and *Quercus spp.* chippings. However several fragments of broken wooden artefacts are also present including two separate withy ties (one *Salix spp.*, one *Frangula alnus* Mill.), part of a *Quercus spp.* board with carved step or stop at one end and part of the wall of a hollowed vessel, probably a bucket, cut from *Fraxinus excelsior* L.

SG 546171. Early fill contains a ‘Beater’ SF24017 cut from *Acer campestre* L.

SG 563060. *Quercus spp.* heartwood chipping in secondary fill of waterhole

SG 568236. *Corylus avellana* L. heartwood chipping in backfill of pit.

SG 636112. *Pomoideae spp.* stake point in fill of ditch.

Late Bronze Age/Early Iron Age (PSH02 features SG 551034, SG 563030, SG 581168, SG 639062, SG 663167):

SG 551034. Two *Salix spp.* stake points and two sections of small diameter roundwood (one *Salix spp.*, one *Alnus spp.*) from revetment of waterhole.

SG 563030. Waterhole whose secondary fill produced a single *Quercus spp.* heartwood chipping.

SG 581168. Secondary fill of waterhole produced five *Corylus avellana* L. heartwood chippings.

SG 639062. Secondary fill of pit producing single unidentifiable and degraded fragment of a withy tie (no SF no.).

SG 663167. Log ladder from primary fill of waterhole and stake point, paper record only, from secondary fill.

SG 712001. Five sections of small diameter roundwood (four *Alnus spp.*, one *Fraxinus excelsior* L.) and an *Alnus spp.* offcut from wattle lining of pit.

Early/Middle Iron Age (PSH02 features SG 592384, SG 593190):

SG 592384. Secondary fill of recut waterhole produced shattered *Salix spp.* roundwood fragments and a ‘beater’ (SF 12060) cut from *Acer campestre* L.

SG 593190. Secondary fill of waterhole produced two *Quercus spp.* heartwood chippings and a *Corylus avellana L.* sapwood chipping.

Middle Iron Age (PSH02 features SG 516066, SG 633086, SG 552395; LFA feature SG 712011):

SG 516066. Waterhole with single halved *Quercus spp.* section of eroded timber.

SG 633086. *Corylus avellana L.* stake point from fill of gully around roundhouse.

SG 552395. Possible natural palaeochannel or alluvial feature (C14 result of 386-203 cal BC). Eight pieces of roundwood recovered, 30-50 dia, seven of which are *Alnus spp.*, one *Corylus*. None of the material has been worked or modified except for one of the *Alnus* sections which has been sawn during sampling.

Middle/Late Iron Age (PSH02 features SG 521069, SG 642004, SG 312048):

SG 521069. The secondary fill contains an abraded *Fraxinus excelsior L.* heartwood chipping.

SG 642004. The secondary fill of this waterhole produced twenty four *Quercus spp.* sapwood chippings and a single *Fraxinus excelsior L.* stake point.

SG 312048. *Acer campestre L.* stake point.

Late Iron Age/Early Romano-British (PSH02 features SG 554112, SG 627042, SG 646018, SG 583118):

SG 554112. Fragments of burnt daub in fill of pit. No wood present.

SG 627042. Section of *Fraxinus excelsior L.* roundwood from fill of waterhole.

SG 646018. Two sections of *Corylus avellana L.* roundwood from fill of waterhole.

SG 583118. Secondary fill of pit produced single section of charred *Quercus spp.* roundwood.

Early/Middle Romano-British (PSH02 features SG 617178, SG 527341, SG 527388, SG 527347, SG 636106):

SG 617178. One *Acer campestre* L. and one unidentified sections of roundwood in fill of pit.

SG 527341. Waterhole with two *Acer campestre* L. stake points and a length of *Quercus* spp. timber with bevelled ends.

SG 527388. Waterhole with revetting of two *Acer campestre* L. and one *Pomoideae* spp. crudely shaped pieces of branch wood and timber. The fill incorporates nineteen fragments of small diameter *Salix* spp. roundwood and three *Acer campestre* L. heartwood chippings. The latter may be derived from working of one of the revetting timbers in situ.

SG 527347. Revetment of recut waterhole SG 527388. Four stake points (of which two *Alnus* spp., one *Acer campestre* L. and one *Fagus sylvatica* L.). Fill contains a single *Fraxinus excelsior* L. withy tie (SF 20052)

SG 636106. Fill of E4 Enclosure ditch producing bag of roundwood fragments (not analysed) and bag of *Quercus* spp. laths/poles.

Middle Romano-British (PSH02 features SG 603205, SG 644006, SG 666001):

SG 603205. Stake point and two sections of roundwood, all *Salix* spp., from fill of palaeochannel.

SG 660004. Fragment of *Quercus* spp. board from secondary fill of pit.

SG 666001. *Quercus* spp. post in base of pit.

Middle/Late Romano-British (PSH02 features SG 636166, SG 644006):

SG 636166. Two *Corylus avellana* L. stake points from fill of E9 enclosure ditch.

SG 644006. Secondary fill of waterhole (with wattle revetment not yet identified) produced ten heartwood chippings (nine *Quercus* spp., one not identifiable), two sections of roundwood (one *Fraxinus excelsior* L., one *Pomoideae* spp.), a *Quercus* spp. stake point, *Quercus* spp. board fragment and a *Salix* spp. withy tie (SF28242).

Late Romano-British (PSH02 features SG 651136, SG 651048):

SG 651136. Two *Quercus spp.* stake points and one stake point cut from *Betula pendula Roth.* from revetment of waterhole.

SG 651048. Eight stake points (three *Alnus spp.*, four *Quercus spp.*, one *Fraxinus excelsior L.*), two sections of small diameter *Corylus avellana L.* roundwood, a *Quercus spp.* heartwood chipping and four bags of broken-up wattle fragments (not analysed) from fill of recut of waterhole SG 651136.

Early Medieval (PSH02 features SG 525080, SG 555805):

SG 525080. Fill of waterhole includes two axe chippings (one *Acer campestre L.*, one *Fraxinus excelsior L.*) and one section of small diameter *Fraxinus excelsior L.* roundwood.

SG 555805. Secondary fill of waterhole produced twelve bark chippings (of which one *Quercus spp.*, one *Corylus avellana L.* and ten *Acer campestre L.*), four *Quercus spp.* heartwood chippings, a fragment of *Corylus avellana L.* roundwood and two *Fraxinus excelsior L.* ladder rungs (SF 20069 and SF 20070).

Medieval (PSH02 features SG 529139, SG 603042):

SG 529139. Part of an *Ulmus spp.* root in the fill of a waterhole

SG 603042. Revetment of ?retting pit, consisting of twenty four stake points (all *Salix spp.*) with single or two hewn facets and three sections of small diameter roundwood (two *Alnus spp.*, one *Salix spp.*).

Post-medieval (PSH02 features SG 530061, SG 546437, SG 559250, SG 570100; TEC05 feature SG 705062):

SG 530061. *Quercus spp.* stake point found in fill of ditch.

SG 546437. Secondary fill of ?retting pit. Incorporates six stake points (five *Salix* spp, one *Ulmus* spp.), seven axe chippings (three *Acer campestre* L., four *Ulmus* spp.), five sections of *Salix* spp. roundwood and part of a sawn *Quercus* spp. board with peg holes.

SG 559250. Tree throw hole whose secondary fill included a single *Alnus* spp. heartwood chipping.

SG 570100. *Quercus* spp. heartwood chipping in secondary fill of modern ditch.

SG 705062. *Quercus* spp. Stake point and section of roundwood from revetment of quarry pit, with three sections of small diameter roundwood (one each *Salix* spp., *Quercus* spp. and *Fraxinus excelsior* L.) and a *Prunus avium* L. twig from the secondary fill.

Undated: (PSH02 features SG 548001, SG 666042; TEC05 features SG 689004, SG 690003):

SG 548001. Tree-throw hole whose fill produced a *Salix* spp. stake point, two sections of *Acer campestre* L. and *Corylus avellana* L. roundwood and two *Quercus* spp. heartwood chippings. All appear to be debris rather than structural material.

SG 666042. Bark chipping, unidentifiable, from ditch fill.

SG 689004. Offcut, paper record only, from secondary fill.

SG 690003. Stake point, paper record only from secondary fill.

Not mapped: (PSH02 features SG 527347, SG 544109, SG 544110, SG 544111, SG 544112, SG 544113, SG 544210, SG 544211, SG 551374 SG 586036, SG 628012, SG 651045):

SG 527347. Contains two *Pomoideae* spp. heartwood chippings.

SG 544109. Four stake points, all *Salix* spp. with single hewn facets.

SG 544110. *Salix* spp. stake point with single hewn facet.

SG 544111. Six stake points, all *Salix* spp. with bifaced and chisel tips. Four winter cut.

SG 544112. Twelve *Salix spp.* and three *Quercus spp.* stake points, with single hewn facets, winter or spring cut. One *Salix spp.* sapwood chipping. Eight sections of trimmed roundwood, one *Acer campestre L.*, one *Fraxinus excelsior L.*, one *Quercus spp.*, four *Salix spp.*, one *Alnus spp.*. Two *Quercus spp.* offcuts from branch wood, one *Salix spp.* heartwood and two bark chippings.

SG 544113. Five stake points (three *Salix spp.*, two *Quercus spp.*) and a badly broken up piece of *Pomoideae spp.* timber.

SG 544210. Chipping from roundwood *Quercus spp.* log

SG 544211. Two chippings from *Quercus spp.* log.

SG 551374. Log Ladder SF10056. *Quercus spp.*

SG 586036. Roundwood post butt cut from *Alnus spp.*

SG 628012. Five stake points (two *Pomoideae spp.*, one each of *Corylus avellana L.*, *Salix spp.* and *Ulmus spp.*), one section of *Ulmus spp.* roundwood, an *Ulmus spp.* heartwood chipping and a section of *Pomoideae spp.* timber from recut of waterhole, undated

SG 651045. Three stake points from a revetment. Paper record only.

Selected small finds catalogue

A number of the artefacts and timbers merit further comments. These are grouped here by date and object type.

Middle Bronze Age

SG 615008

SF 24001. Log Ladder. Section of roundwood in three refitting parts, No bark present. Lower end hewn to create flat base with slight bevel. Single step cut towards top end. Top end eroded and damaged above notch. 983 l, 166 dia. Step 657 from lower end, 60 deep. 'Tread' notch c. 130 l. *Alnus sp.* Context 615017.

SG 711024

SF 28916 Morticed timber. Cut from halved parent log with no bark present. One end hewn square to axis of timber, other end tapers slightly along one edge with bevel from one face. Three through mortices (i) 160 l, 92 w, (ii) 147 l, 90 w, (iii) 192 l, 80 w, hewn into upper face with good axe or broad chisel stop marks 51 w in ends of mortices. In twenty two refitting and two non refitting fragments, but some portions missing. 1.458 m l, 147 w, 70 th. *Quercus* spp. Context 711027

SG 708014

SF 29560. Possible bark container. Refitting parts appear to have a deliberately cut curving edge. Indications of several small through holes in some fragments. In thirty five fragments of which seven partially refit. Not reconstructible. *Salix* spp. Context 708023

Middle/Late Bronze Age

SG 553181

SF13260. Spike. Roundwood shaft, partial bark present, cut to form even taper towards tip. Tip detached but refitting, other end broken and missing. 253 l, 20 dia. *Fraxinus excelsior* L. Context 553180.

SG 611107

SF 12045 Wooden Bowl. Cut from halved blank with rim towards inside of parent log. Single integral carved loop handle with flat base and no decoration. Surfaces worn. Split in two along old break which has pairs of stitch holes (with in situ fibrous material) either side of the break forming an old repair. Four small detached fragments and some accidental damage from monolith tin before discovery. Some lateral distortion from compression during burial. Axial length (including handle) c. 213, Axial width c.180 w, OA c.190 dia, height base to rim c. 96, walls up to 10 th. *Populus* spp. Context 611101.

SG 685032

SF 29725 Log Ladder. Section of quartered timber, no bark present. Lower end hewn to create flat base with slight bevel. No indication of notches or treads of steps. Main section broken across at large group of knots. Ladder above this is very fragmented into three refitting and two non refitting sections. No convincing refit to

main section due to damage and abrasion. 1.414 m l, 148 w, 145 th. *Quercus spp.*
Context 685035.

SG 687006

SF 29516. Possible bark container. In twenty three non refitting fragments with no working marks, cut edges or features. Largest fragment 171 l, 76 w, 03 th. *Salix spp.*
Context 687040.

Late Bronze Age

SG 517310

SF20030. Withy Tie. One 15 dia. strand, 'S' twist with two smaller 10 dia. 'S' twist strands plaited around it in a 'Z' twist. Par of a 13 dia. fourth strand at one end. Several detached fragments, ends broken and missing. Rope overall 497 l, 28 dia. *Salix spp.* Context 517298.

SF20033. Withy Tie. Loop formed from four 'S' twisted strands plaited 'Z' fashion about each other with a separate 'S' strand knotted about one part to extend the rope. Partially frayed and fragmented, ends broken and missing. *Frangula alnus L.*
Context 517274.

No SF Number. Board cut from tangentially faced billet with integral transverse ridge or step c. 30 l at one end. Axe marks 42 w on inner edge of step/ridge. In eight refitting fragments, missing section forming apparent hole though face. 448 l, 134 w, board end 19 th, step end 44 th. *Quercus spp.* Context 517280.

SF 20035. Part of lower end of wall from bucket or similar vessel originally c.320 dia., hollowed from section of roundwood. Lower end has ridge carved from the solid timber of the inner face with bevel to face of wall and flat bottomed groove below this for the (missing) base. Chisel marks in groove <35 w. In four refitting pieces. 151 l, 190 w, wall 15 th, ridge 47 th. *Fraxinus excelsior L.* Context 517298.

SG 546171

SF24017. 'Beater'. Artefact cut from halved timber with one tapered and rounded end and other end roughly hewn. No evidence for mounting or hafting. Very abraded

surfaces. In two refitting parts. 299 l, 53 w, 36 th. *Acer campestre* L. Context 546175.

SG 663167

SF 27126. Log Ladder. Section of roundwood, partial bark present, several side shoots/branches hewn back to leave prominent stumps. Butt end has four hewn facets cut to create tapering pentagonal cross section tip. Single notch hewn for c. 60 deep tread 335 from tip. Broken into two refitting sections across tread. Top end broken away and missing. *Alnus spp.* Context 663171.

Late Bronze Age/Early Iron Age

SG 639062

No SF no. Withy tie. Soft degraded and broken up beyond reconstruction. No species identification possible. Context 639064

Early/Middle Iron Age

SG 592384

SF 12060 'Beater'. Artefact cut from tangentially faced timber, worked on all surfaces, tapering evenly along length. Thinner end worn and abraded to approx. oval cross section, thicker end less worn and polygonal in cross section. Thicker end detached but refitting. Some slight surface damage. 312 l, 70 w, 26 th. *Acer campestre* L. Context 592388

Romano-British

SG 527347

SF 20052 Withy Tie. Object divided between two boxes but contents of each box broken up beyond reconstruction. *Fraxinus excelsior* L. Context not recorded.

SG 644006

SF28242 Withy Tie. Three non articulated 'S' twisted strands with many tiny non refitting fragments derived from them. First 182 l, 18 dia, second 132 l, 19 dia, third 144 l, 17 dia. All *Salix spp.* Context 644008.

Early Medieval

SG 555805

SF 20069 Ladder Rung. Pared down from section of roundwood. Both ends evenly whittled for c. 60 of length to reduce diameter and to fit into sockets in (missing) rails. Slightly curved along length. 387 l, 36 dia. *Fraxinus excelsior L.* Context 555828.

SF 20070. Ladder Rung. Pared down from section of roundwood. Both ends evenly whittled for c. 60 of length to reduce diameter and to fit into sockets in (missing) rails. Part of one end broken and missing. 353 l, 36 dia. *Fraxinus excelsior L.* Context 555828

Post-medieval

SG 546437

SF 8180. Board. Tangentially faced corner section of a larger board cut from branch/trunk junction with very irregular grain pattern. Saw marks across both faces from conversion. Two 30 dia. auger holes towards one end. Working is very even and sharply cut. One detached but refitting fragment. 248 l, 215 w, 38 th. *Quercus spp.* Context 546439

Not mapped

SG 551374

SF10056. Log Ladder. Section of quartered timber, no bark present. Lower end hewn to create flat base. Two hewn notches for treads at 420 and 795 from butt end. Surfaces abraded and eroded with crush pitting from gravel fill of findspot. Upper

end attenuated by drying in ground. Hole through face caused by rotting out of side branch 1.121 m l, 218 w, 122 th. Notches c.45 deep, c.125 long. *Quercus spp.* Context 551373.

Small finds discussion

Middle Bronze Age

Access to one waterhole was provided by log ladder SF 24001. This is very similar to those recovered at Perry Oaks (Allen 2001), with an axe hewn end and single notched step. The step was cut just over half of the thickness into the *Alnus spp.* log. The step is closer to the butt end than in the WPR 98 examples and would have been easier to use. Sadly the ladder had been truncated above the water table and it is not known whether further steps had been cut. In what seems to be a familiar pattern the log was placed butt end down in the waterhole, thus tapering naturally towards the upper end.

Several possible bark containers were noted in the excavation records for various features and periods but the only partly convincing example is SF 29560. Much of this can no longer be refitted, but those which do exhibit a curved edge, almost as if the object had been part of a disc. Enough wood had been left on the bark to allow its identification as *Salix spp.* Some small holes which could well have been used to stitch the artefact together are present but no coherent pattern could be identified and the form of this object is not known.

Non-roundwood structural timbers are uncommon in Bronze Age contexts and those with indications of joints are rarer still. Thus the morticed timber SF 28916 is an exceptional find. Strictly speaking, a mortice should only be called a mortice if it articulates with a tenon (Goodburn 1991) and sadly, there are no articulating timbers which would indicate what this timber was used for or was a part of- and indeed, no other timber from the same feature which might be associated with it. There are three though sockets, of slightly different sizes, all hewn out with what seems to have been a broad metal blade 51mm across with a pronounced curve to its cutting edge, probably at this date of Bronze. This was probably a chisel, though an unhafted axehead or palstave could just have been suitable for the same purpose.

Morticed timbers of Bronze Age date have been identified on a number of sites, notably at Flag Fen (Taylor 1992, 490), though none are directly comparable with the Terminal 5 example discussed here. All the surfaces are abraded and consequently wear patterns cannot be used to show how the timber was employed. The sockets are certainly large enough to house other timbers or tenons cut into them but there are no marks which could confirm that any such were fastened in place with wedges. One end is pointed as if to be embedded in the ground and the timber could thus be plausibly identified as a post supporting horizontal rails. These might be arranged as three parallel rails passing through the timber, or any combination of two rails to one side and one to the other. An alternative possibility would have this timber employed in a structure as a form of plate- either laid on the ground and housing the bottom ends of posts or being used to tie the tops of three posts together into a semi-framed arrangement.

It is unlikely at present that we will be able to determine its actual function. The timber has a significant quantity of sapwood present along its edges yet there is no trace at all of any woodworm attack. This argues that the timber was placed into its waterlogged findspot fairly shortly after being finished and thus that the timber might never actually have been used for its intended purpose.

Middle/Late Bronze Age

Another log ladder for access to a waterhole is represented by SF 29725. This example is cut from *Quercus spp.* and has been quartered from a much larger parent log, placed butt end down in the waterhole. The usual axe hewn base is present but unfortunately, the artefact was too badly damaged to be able to identify where the treads were cut. The timber was not of especially high quality, with several knots midway along the surviving length across and above of which the timber has shattered. Again it was placed with the original butt end of the parent log at the lower end of the ladder, i.e. oriented as it would have been when growing.

Three small finds are of note. The first, SF 29516 may once have been a bark container but its shattered fragments have no stitch holes or cut edges present and in the absence of other evidence it may be nothing more than a group of bark chippings stripped from a roundwood *Salix spp.* log and discarded.

SF13260 was initially identified as a stake and indeed may well have been used as such when it was found. However, this length of small diameter *Fraxinus excelsior* L. roundwood does not have a roughly hewn tip but instead has a smooth and even taper from one end to the other which is not the product of abrasion, erosion or attenuation but of deliberate working.

A recut waterhole of this period produced what is potentially the most important single artefact from the entire project. SF 12045 is an almost complete carved wooden bowl. Some minor damage was suffered from the monolith tin responsible for its discovery and some small fragments lost but it is otherwise complete. The vessel was carved from a halved blank, oriented with the rim of the bowl towards the split interior of the parent *Populus spp.* log and the base towards the bark edge. Some distortion has taken place due to the pressure of overlying deposits but the artefact originally had a flat rim and flattened base. A carefully shaped single loop handle was carved along the longitudinal axis of the wood from the solid, the upper surface of the 45mm deep handle being located c. 30mm below the rim.

Not all of the damage to the artefact was modern. When lifted it was apparent that the bowl had split in two along the grain. Such damage might be expected and could have been a reason for the disposal of the object. However this split was ancient and had been repaired. Either side of the split were pairs of small c. 1mm dia. holes cut through the wall of the vessel, some of which had fragments of fibrous organic material present. The location of these holes suggests that they are stitch holes, used to sew the two halves of the split together and maintain the integrity of the vessel. This is evidence that this bowl had a functional working life which was worth prolonging and that it was a valued possession.

Several 'prehistoric' carved wooden bowls, with handles, are known from the British Isles. In form the Heathrow bowl is quite different from examples found in Scotland or Ireland at, for example, Talisker Moor, Skye (Barber 1982, 578), Loch Laggan, Ardgour House and Dalvaird Moss (Maxwell 1951), Bracadale, Skye (Crone 1993, 271), . These have carinated profiles with everted rims and 14C dating places them in the late Iron Age (Earwood 1990, 44). The handle forms are also very different, being either simple loops or flat lugs.

The form is unrelated to ladles of Bronze Age date such as those from Runnymede (Heal 1992, 140-141), Fengate (Taylor 1992, or Caldicot (Earwood 1997, 207). The bowl is relatively plain but the handle is carefully and elegantly carved, flaring out to meet the wall of the vessel. At present, the Heathrow bowl seems to be unique in its degree of completeness and date.

Late Bronze Age

A Log ladder from waterhole SG 663167, SF 27126 is the only substantial timber from this period. Cut from *Alnus spp.* branch wood, it was incomplete when found, the upper end having been broken away and lost at some point. Unusually, the butt end is hewn to form a point, to be driven into the base of the feature, rather than just resting on it as the other log ladders. One notched tread is present. As with the ladder described earlier, it was placed with the original lower end of the log down in the base of the waterhole.

The fill of a recut of waterhole SG 517310 included a number of pieces of wood. Several of these are artefactual and constitute (at four items) the largest group of wooden small finds from this part of the project. Two of these are withy ties, pieces of wooden rope made from plaiting twisted strands of young, small diameter roundwood about each other. In each case, the individual strands are twisted to give the grain an 'S' pattern and then plaited about each other in the opposite manner, forming a 'Z' twist. One straight length of rope, SF 20030 was found, made from *Salix spp.* shoots. This was part of a longer length- both ends are broken- but there is no indication of how long a piece of rope it originally was. SF 20033 is a terminal, formed into a loop with the end of a straight piece knotted about it, made from *Frangula alnus spp.* This was intended to loop over and secure or suspend one item from another but again, we cannot be sure what the exact function was.

The closest parallels for these objects, chronologically and physically, are the examples from the neighbouring site at Perry Oaks (WPR 98; Allen 2001). Similar objects are known from other Bronze Age contexts such as Wilsford G33a (Ashbee 1989, 59), and North Ferriby (Wright 1990, 65). However another possible function is suggested by the length of wood rope found fastened around the looped handle of a

hollowed wooden bucket recovered from a Bronze Age context at Pode Hole Quarry, Northamptonshire (M. Taylor, pers. comm.).

SF 20035 is part of the lower end of a bucket or similar container. This was created by taking a roundwood log of *Fraxinus excelsior* L. and hollowing it out. On the inside of the vessel, just above the base, a thicker flange running around the inside of the vessel was carved and a groove let into this flange to house the separate base board of the vessel. No trace of the base board was found and no evidence for any waterproofing material in the groove was present. The original diameter of the vessel is uncertain, as such vessels may distort in use and after burial and we cannot be certain how this may have affected the fragment we possess. However, the best estimate we can make, assuming the vessel was a regular cylinder, would be around 320mm in diameter. The height of the vessel is not known, but assuming that this vessel is similarly proportioned to better preserved examples, a height to the rim of around 450mm might be expected.

Similar vessels are known from several bronze age sites including the shaft at Wilsford 33a (Ashbee 1989, 54), Stuntney Fen (Clarke, 1940, 54), Caldicot (Earwood 1997, 208) and a waterhole at Thorney, Cambridgeshire, all of which are alder, except for the Caldicot example which is ash.

The final notable small find from SG 517310 does not have a number. Recovered in fragments from the fill (Context 517280) its eight pieces make up a tangentially faced board with a flange or transverse ridge at one end. This flange is straight sided and perpendicular to the surface of the board, hewn with an axe blade whose cutting edge was some 42mm wide. There are no fixings or fittings to aid its interpretation. Sadly it is incomplete- the opposing end is broken away and missing. It was suspected that it might be part of a hollowed vessel but the board has no curvature. At present its function is a mystery, and no similar artefacts have been published to date which might shed light on its purpose.

Elsewhere, a 'Beater' (SF 24017) of the same form as the two recovered from WPR98 was recovered from waterhole SG 546171. A second (SF12060) was found in the Early/Mid Iron Age waterhole SG 592384. Both are cut from Field Maple, roughly halved and trimmed to shape with axes. They taper along their length having a distinct narrower and wider ends. The narrower end is quite worn to a rounded near

oval cross section devoid of tool marks whilst the wider ends still exhibit rough axe hewn facets from their shaping. Though slightly abraded, the facets are still clear and fairly sharp. No fixings or fittings are present.

It was previously considered (Allen 2001) that these artefacts might have had a symbolic use as wooden axe head substitutes for missing metal examples, based on their form, wear pattern and association with used axe handles with missing blades. The two new examples show more clearly that differential wear is present. One end- in each case the narrower end- is worn while the thicker end is not. In the light of this and of further research, it is now possible to offer a more convincing identification of these 'beaters'. Early forms of tillage utilise an Ard. At their simplest, these consist of a beam or bow, used to tow and/or push, and to steer, into which is fitted a share. The share is housed in a socket cut through the bow and wedged in place, leaving the share projecting down from the bow, cutting the furrow as the assembly is pushed or pulled along. The most basic form of share is known as a 'Bar Share', a simple length of wood, stone or metal wedged into the bow.

If one of these 'beaters' were fitted into such a socket and wedged in place it could easily act as a 'Bar-Share'. The woods from which these beaters are cut (*Acer campestre* L and *Pomoideae spp.*) are fine grained and relatively hard wearing and would be quite suitable for such a purpose. The differential wear is very similar to that exhibited by stone examples described from Shetland and Orkney (Fenton 1964, 265-7) and on Romano-British iron examples from Silchester, Hampshire and Great Chesterford, Essex. These have tips worn to a tapering oval cross section over some 100-150mm of their narrow ends, but are otherwise undamaged. The 'beaters' from WPR98 and PSH02 exhibit very similar wear patterns and are of similar size to the majority of the stone and both of the iron examples. It seems inescapable that these 'Beaters' are Bar Shares- the discarded working tips of an early form of plough.

A waterhole is not perhaps the most natural place to find this type of artefact in use and it is a little odd that none appear to have suffered any damage prior to burial which would prevent their continued use. Accidental loss of four such artefacts in a comparatively narrow spatial area would be unusual and some element of intentional deposition may therefore be inferred.

Late Bronze Age/Early Iron Age

The only small find was a single fragment of a withy tie from context 639064. Sadly this had disintegrated by the time it arrived for study and not even species identification was possible.

Early/Middle Iron Age

A single 'Beater' SF 12060, discussed above, was recovered from a waterhole, SG 592384.

Romano-British

Two withy ties of this date were recovered. One, SF 20052 had disintegrated but could still be identified as having been cut from young roundwood shoots of *Fraxinus excelsior* L.. SF 28242 (*Salix spp.*) may have been either three strands plaited about each other or parts of a single twisted strand broken into three non refitting sections. Though usually associated with prehistoric contexts, examples from Romano-British sites are being identified, not least from Perry Oaks (Allen 2001).

Early Medieval

The two ladder rungs (SF20069, SF20070) are rare finds. Both have been pared down from small diameter roundwood and their surviving ends have been carefully trimmed to create short, blunt points which would fit into holes cut in the rails. No holes for peg or nail fastenings are present, not are there any wedges which might have been driven into the end grain of the rung to lock it in place. It may be suggested that the holes housing the rung ends did not pass all the way through the rail.

Parallels for these rungs are not easy to find. A single example cut from beech (*Fagus sylvatica* L.) was identified from a 12th-13th century pit at Pevensey Castle, Sussex (Dunning 1957, 211), but the one surviving end is pierced by a single hole to allow a peg to fasten it into the rail. Three examples, one each of alder, field maple and hazel have been found at 16-22 Coppergate in York in C10th-C11th century contexts (Morris 2000, 2320). These have tapered ends to fit into holes augered into

their rails and no piercing for pegs, the ends being locked by wedges driven into the exposed end of the rung from outside the rail. A similar method seems to have been used to attach the oak rungs to the alder rails of a late C12-mid C13th ladder from 1-5 Aldwark, York (MacGregor 1988, 71). Currently the best parallel is a recently recovered C12th-C14th century example from Fox Covert, Dinnington, Newcastle upon Tyne (Allen 2006) cut from ash.

Post-medieval

It is not clear what SF 8180 was part of as there are no diagnostic wear patterns or working technology. However it demonstrates the improvement in woodworking technology brought about by using large saws. Though tangentially faced boards can be produced by splitting with wedges and mallets, the use of a saw allowed this board to be cut from what might have been seen as fairly unpromising raw material, at the top end of the parent log, incorporating a major branch junction.

Not mapped

A third log ladder was recovered from SG 551374 but this is not plotted on the database. Cut from quartered *Quercus spp.* timber with a flat base and two hewn notches for treads it is probably prehistoric but a Romano British date cannot be ruled out. Similarly, part of the wall from a hollowed roundwood tub probably similar to SF20035 was recovered from context 517293 but this is currently unphased and though probably prehistoric, a later date cannot be entirely excluded.

The use and character of wood from the Heathrow Terminal 5 sites

The immediate impression gained from this wood assemblage is that it is sparser, more widely scattered, than the assemblage from the Perry Oaks WPR98 project. The overall size of the assemblage and the quantities present in the individual SGs are smaller, though there are more actual features producing wood.

This does not seem to be the result of differential survival. Wood was preserved in the same type of feature as were present at Perry Oaks- waterholes, wells, pits and

ditches. The same waterlogged, anoxic burial conditions were responsible for the preservation of wood in both areas. Any difference in the local water table was not evident on the wood and there were no instances where wood from the Terminal 5 sites had been markedly more dried out or desiccated on excavation.

Little if any of the wood had arrived in its burial context by accident. Apart from the deliberately placed linings and stakes/piles, many of the smaller fragments have ended up in the archaeological record because it was decided not to recycle them, either as other artefacts or fuel. The concept of 'Accidental' loss is difficult to understand in this context as many of the waterholes seem to have been accessible either through shallow shelving sides or by ladder. Any object which found its way into one of these features could have been retrieved if it was valued.

The presence of used but otherwise undamaged artefacts must therefore require some explanation aside from casual loss. Leaving aside any symbolic importance, each of the objects had a practical value which would have required both time, effort and resources to replace. The case of the carved bowl is instrumental here. This artefact had been broken and then quite carefully repaired. The two halves were still articulated on excavation and failure of the repair was not therefore the reason for its disposal. This artefact, together with the used but otherwise undamaged bar shares, had value and the decision to dispose of them in their respective burial contexts must imply some sense of 'sacrifice'.

Most of the material recovered is roundwood, derived from stake built revetments used to line the sides of waterholes and pits. Few of these have enough material to allow any meaningful statistical analysis. All of the stakes and piles, of whatever period are simply modified, with hewn points at one end. No particular preference in working methods is apparent and there is little uniformity in the wood species used: *Alnus*, *Corylus*, *Fraxinus*, *Quercus* and *Salix* are used in varying combinations throughout the occupation span of the site. Only where larger groups of material are present is there the occasional use of other species, such as *Acer campestre* L, *Betula* or *Pomoideae spp.* The exception to this is the lining of a post medieval pit SG 603042 which is composed uniformly of *Salix spp.* stakes each point of which was created by one or two hewn facets.

Tree ring analysis to investigate selection and woodland management practice could not be carried out owing to the recovery method used in the excavation of those features where such assemblages had survived.

In terms of species exploitation, the pattern for the Bronze Age and Iron Age woodland seems very similar to that of the WPR98 sites. Oak, ash, willows, alders with occasional field maple, and isolated samples of *Pomoideae spp.* and birch, are present. Hazel is found more frequently than at WPR98, otherwise the picture of a lowland river valley woodland, with wet or damp locations and base rich soils suggested by that assemblage seems to be confirmed. Most, if not all, are capable of management by coppice or pollarding though sadly, positive evidence for this is missing. One oddity which should be mentioned is the presence of a small section of sweet chestnut roundwood apparently from an early/middle bronze age context. Sweet chestnut is believed to be a Roman introduction (Nayling 1991) and it is thus surprising to find it in such an early context. The possibility of accidental contamination by a later feature should be considered.

The Romano-British woodland resources continue the picture first seen at Perry Oaks, though now a little more field maple is present and the odd piece of beech is found. There is very little medieval or post medieval wood and what remains are somewhat skewed as they are derived from a very small number of features. None the less, the more uniform appearance of these structures strongly suggests they are constructed of more carefully selected wood.

Although there are numbers of chippings in fills associated with wooden linings, in no case can they be convincingly shown to have been derived from the making of the adjacent structures. The waste from the cutting and preparation of stakes, lengths of roundwood and similar was either done elsewhere or carefully disposed of away from the feature concerned. The chippings which are present are the result of later woodworking in the vicinity, material which was caught up in the filling of the feature. Most of these chippings are oak and the presence of other species means this is not the product of accidental survival. Oak is not the predominant wood utilised in the various pit linings and the conclusion must be that other timber structures, now vanished, were being built or prepared nearby.

Prehistoric tools are attested by several toolmarks. A chisel with a blade width of 51mm was used to hew the mortice ends of SF 28916. Axes were used to cross cut and hew the ends of timbers and roundwood and to cut the sharpened pointed tips of stakes, but few blade widths could be measured. Chisels or gouges were used to shape and hollow the bowl SF12046 and the bucket SF 20035, those used to trim the groove in the latter being less than 35mm wide.

Axes continued to be used for shaping stake points through to the post medieval period, but any change in blade material, shape or design is not reflected in the marks they made. Sawn timber appear in the medieval period but the one example is not especially early and does not cast light on the development of woodworking technology outside of the immediate locality. None of the tools used for marking out timbers or joints are attested, nor is there any evidence of tools used for splitting wood.

The wood from this project has offered some insight into what woods were considered suitable for particular purposes and what resources were available to the communities which existed locally. The assemblage includes some unique artefacts and is of nationally significance. The site has produced the majority of the known log ladders in the British Isles, what may be the first positively identified wooden bar shares and a bowl whose form, date and completeness, with evidence for repair and use, has no published parallels.

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