

Whitley Castle (Epiacum) Roman Fort, Northumberland: Operation Jericho

Quern Assessment Summary

Assemblage:

- 23 querns: weight 150kg, for a collection estimated at 525kg intact (> ½ tonne!).
- all the querns were hand-operated, with no evidence of the presence of mechanically powered millstones.
- unusually, this assemblage lacks any primary contexts or dates – so any conclusions have to be solely derived from the inherent properties of the querns.
- the bulk of the fragments come from a collection of eighteen Roman hand querns which can reasonably be assumed to come from the fort and its associated *vicus*.
- the remaining four fragments are all uncompleted rough-outs with a wide chronology, ranging from a beehive quern (mid-Iron Age – late Roman), three disc querns (Roman to possibly Medieval) plus a likely pot quern (post AD 12th C). Their presence could be explained if the wall builders had collected them from nearby quern quarrying and preparation areas [cf the wide time range of the debris recorded at the quarry site of Wharncliffe Rocks by Pearson & Oswald (2000)]

Disc Quern Types

Traprain Law (“TL”) *type querns* – upper stones with collared hoppers and handle slots in upper surface:

- all three upper stones are of ‘standard’ diameter 390mm (+/-30mm), with none of the larger variant, 480mm (+/-50mm).
- as five of the lower disc querns are also in this ‘standard’ size range, it is likely that some of these stones will have been paired with a TL upper and thus be of a comparable date.
- such smaller hand querns seem to have an earlier starting date (typically extending from 2nd - 4th century AD).
- in the north of England, this quern type is strongly associated with Roman forts (providing 19 of the 37 known examples) and with civil sites close to Roman roads.
- previously Catterick was the fort in northern England with the most TL querns, with 3 examples (this is now matched by 3 from Epiacum)

Other Discs:

- Only one upper stone (No 4) closely mimicked imported lava querns, suggesting that it was Early Roman in date, but the rest don’t have these early features, so are probably Antonine or later.
- No upper stone had the characteristic outer flange of a lava quern on its upper surface.
- Seven examples had grooving on their grinding surfaces to enhance their performance. Six of the 18 disc querns (30%) had a 6-harp pattern and all rotated anticlockwise. This broadly matches expectations, as only c.30% of all UK disc handquerns use ‘harps’ and, of those with a rotational preference, 60% are anti-clockwise.

Lava Disc Querns:

- none were collected – despite local ‘basalt’ being used as a wall material.
- As lava querns are quite brittle and have poor survival characteristics in acid environments, it is likely that their absence from the wall reflects their non-availability to the builders due to prior breakage.

Millstones:

- their absence could be significant. Comparable fort assemblages usually contain several millstones.
- In view of the absence of any disc querns with diameters of 455-525mm, this could suggest that, when the army abandoned the site, the more valuable larger querns and millstones were taken away for reuse.

Lithology:

- awaits detailed geological examination – they seem to be a mixture of local sandstones and Millstone Grit.

Summary of Whitley Castle Querns

No	Sect No	YQS No	Type	U/L	%	Diam (mm)	Rim Ht (mm)	Wt (Kg)	Intact (Kg)	Est Wear (%)	Lith
1	8	8101	'T L' Disc	U	40-45	355	c.70	5.5	13	50-60	MSG
2	14	8102	'T L' Disc	U	30	360	75	5.7	19	5-25	S/S
3	16	8103	'T L' Disc	U	25	425	55	4.6	19	50	MSG?
4	Gap2	8121	Disc- Harp (A)	U	23	c.360	55	3.2	13.5	55-75	S/S
5	23	8120	Disc	U	35	360	60	5.0	14	45-65	MSG
6	7	8111	Disc- Harp (A?)	U	10	c.400	42	1.2	12	85	MSG
7	22	8115	Disc	U	c.20	400	60	3.1	15	65-80	MSG?
8	2	8110	Disc- Harp (A)	U?	10	c.400	52	1.3	13	70-75	MSG?
9	8	8113	Disc- Harp (Radial)	U	17	450	90	4.5	27	25-35	S/S
10	23/28	8107	Disc- Harp (A)	L	30-40	>300	<95	9.0	23-33	25	S/S
11	7	8118	Disc	L	50	330	75	6.0	12	25-85	MSG?
12	25	8116	Disc	L	c.10	c.380	45	1.4	14	80	MSG?
13	U/S	8109	Disc	L	10-15	400-450	52	1.8	16	70-80	MSG?
14	26	8108	Disc	L	47	c.420	60-65	10	21	50-60	S/S
15	15	8114	Disc	L	47	430	80-90	13.5	29	25-35	S/S
16	23	8104	Disc- Harp (A)	L	17	450	75	4.4	26	50	MSG?
17	8	8105	Disc- Harp (A)	L	17	c.450	75	5.7	31.5	35-45	MSG?
18	16	8119	Disc	L	20	c.450	85	7.5	37	20-25	MSG?
19	23	8122	Beehive Rough-out?	L	19	300-350	90	5.0	26	Nil	S/S
20	15	8112	Disc Rough-out?	L?	25	375-425	26	8.5	34	Nil	MSG?
21	24	8124	Disc Rough-out	L	95	400-410	c.100	28	30	Nil	S/S
22	24	8123	Disc Rough-out	L?	40-45	430	95	13.5	32	Nil	S/S
23	10	8117	Pot Quern Rough-out?	U	27	250	75	2.1	7.5	27	S/S
Σ								150.5	526.5		

Table 1: Whitley Castle Quern Summary

Quern Distribution along the Wall:

- Querns were recorded by the 5m length of their individual wall sections.
- The densest concentrations were between sections 7-16 (with 11 querns) and between sections 22-26 (which contained 9 querns)
- The distribution of quern types is random, with no suggestion of a particular sector being preferentially built from a freshly robbed quern assemblage. The presence of three (out of the four) quern rough-outs in sections 23 & 24 may suggest the delivery of a batch of stone from a nearby quern quarry.

Section	2	7	8	10	14	15	16	22	23	24	25	26	Gap ₂	U/S	Σ
TL Upper Disc	-	-	1	-	1	-	1	-	-	-	-	-	-	-	3
Disc-Upper	1?	1	1	-	-	-	-	1	1	-	-	-	1	-	5 + 1?
Disc-Lower	-	1	1	-	-	1	1	-	2	-	1?	1	-	1	8 + 1?
B/H Rough-out	-	-	-	-	-	-	-	-	1?	-	-	-	-	-	1?
Disc Rough-out	-	-	-	-	-	1	-	-	-	2	-	-	-	-	3
Pot-Quern Roughout?	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1
Σ	1?	2	3	1	1	2	2	1	3+1?	2	1?	1	1	1	20+3?

Table 2: Distribution Along the Dismantled Wall

Size Range of Disc Querns Made from Local Stone

- YQS data demonstrates a bimodal distribution of UK disc hand quern sizes. From a sample of 543 stones, the strongest peak is at c.400mm, with a smaller focus around c.450mm.
- Whilst the smaller peak may be the result of small rim fragments being recorded as either c.400mm or c.450mm, the major UK peak at 400mm is real, as lava discs strongly favour that size.
- When compared with the UK figures, the querns from Whitley Castle lack any 'Large' querns with diameters beyond 450mm and contain more of the smaller 'Standard' querns.
- We know from Diocletian's Edict of AD 301 that the larger millstones were more costly than the more easily fabricated smaller stones.
- The absence of hand querns of >450mm diameter (and the total absence of millstones (>525mm diameter) could suggest that these more valuable stones had been preferentially removed when the army abandoned the site.

UK Diameter (mm)	'Standard' size					'Large' size					Σ
	<349	350-369	370-389	390-409	410-429	430-449	450-469	470-489	490-509	510-520	
Number	33	48	47	112	75	38	62	44	44	40	543
%	6	9	9	21	14	7	11	8	8	7	100

Whitley Castle Diameter (mm)	'Standard' size					'Large' size					Σ
	<349	350-369	370-389	390-409	410-429	430-449	450-469	470-489	490-509	510-520	
Number	1	4	1	5	3	2	4	-	-	-	20
%	5	20	5	25	15	10	20	-	-	-	100

Fragmentation Pattern of Disc Querns Made from Local Stone

- From the limited amount of data so far collected by YQS, the pattern of quern breakage appears broadly consistent with that recorded from a similar assemblage at Catterick fort.
- This suggests that the quern fragments had been re-used in the dry-stone wall as found, without being further modified during wall construction.

% survival	Whitley Castle		Catterick Local Discs		Haggs Farm	
	No	Σ%	No	Σ%	No	Σ%
<1					1	7
1-5			3	13		7
6-10	3	14	1	18		7
11-20	7	48	6	45	8	60
21-30	4	67	5	68	3	80
31-40	2	76	3	82	1	87
41-50	4	95	4	100	2	100
51-60	-	95				
61-70	-	95				
71-80	-	95				
81-90	-	95				
91-100	1	100				
Σ	21		22		15	

Table 3: Fragmentation Patterns

Estimation of the Extent of Wear on Querns Made From Local Stone

- Having built up a data-bank of the rim heights and the estimated weights of a wide range of querns, ranging from unused rough-outs to abandoned, exhausted querns, YQS now routinely estimates the quern usage.
- Taking the average of these two independent wear determinations enables us to compare the pattern of usage at Whitley Castle with that at other Roman sites.
- The wear profile at Whitley Castle is quite mixed, with the three rough-outs being joined by at least five other modestly-used querns (similar to the usage at the Catterick Bridge-head), together with at least five well-used examples (comparable to that at Hags Farm, a ‘civil’ site in Swaledale).

% worn	Whitley	Castle	Catterick	a)Vicus	b)Bridge	-Head	Hags	Farm
	No	Σ%	No	Σ%	No	Σ%	No	Σ%
0-10	3	14	1	8	2	25	1	7
11-20	1	19	2	25	3	62		7
21-30	4	38	1	33		62		7
31-40	1	43	2	50	1	75	2	20
41-50	2	52	3	75		75	3	40
51-60	4	71		75	1	87	2	53
61-70	1	76	1	83	1	100	3	73
71-80	4	85	1	92			3	93
81-90	1	100		92			1	100
91-100			1	100				
Σ	21		12		8		15	
AveWear		43%		42%		26%		55%

Table 4: Quern Usage

How do the Range of Quern Types Compare with Other Northern Military sites?

- Lava querns typically constitute 30-60% of the assemblage at all military sites.
- Millstones are around 6-8% of military assemblages – so we'd expect 1-2 millstones from the site.
- Isolated beehive querns are common finds from military sites.

Yorkshire Sites – Five Dere Street - 'Military' sites

Site	Saddle/ Rubber	Beehive	Non- Lava Disc	Lava Disc	Small Mill-Stone	Large M/S	Total
Diameter (mm)			250-524	250-524	525-649	>650	
Total	13	36	79	130	16	8	280
Percentage	5%	12%	28%	46%	6%	3%	100%

Hadrian's Wall – Six 'Military' sites

Site	SQ	Beehive	Non-Lava Disc	Lava Disc	Small Mill-Stone	Large M/S	Total
Diameter (mm)			250-524	250-524	525-649	>650	
Total	2	40	108	72	12	5	239
Percentage	1%	17%	45%	30%	5%	2%	100%

North Pennine Military Zone – Five Sites abandoned by AD 150

Site	SQ	Beehive	Non-Lava Disc	Lava Disc	Small Mill-Stone	Large M/S	Total
Diameter (mm)			250-524	250-524	525-649	>650	
Total		14	54	28	5	3	104
		13%	52%	27%	5%	3%	100%

North Pennine Military Zone – Sites with longer occupations (min 15 querns)

Site	Date	SQ	Beehive	Non-Lava Disc	Lava Disc	Small Mill-Stone	Large M/S	Total
Diameter (mm)				250-524	250-524	525-649	>650	
Walton-le-Dale- 1980/96	90-250+	1	3 (+1?)	30 (+8?)	11 (+60)	1	-	115
Binchester (1976-91)	70-400+	-	2	17	12	(2?)	1	32 (+2?)
Maryport		-	3 (+3?)	11 (+9)?	2	3	2	33
Piercebridge	70-400+	-	1	6	15	1	1	24
Ribchester	70-370	-	7	4	10	1	-	22
Whitley Castle (2018)	Early 2 nd - mid 4 th	-	1?	21	-	-	-	21 (+1?)
Adel Fort/ Vicus	1 st -4 th C	-	2	10	4	3	-	19
Old Penrith (1935)	85-350?	-	-	-	1	2	-	3
Total		1	23	116	115	13	4	272
Percentage		-	8%	43%	43%	5%	1%	100%

Scottish Military Zone – Nine forts

Site	Saddle	Beehive	Non-Lava Disc	Lava Disc	Small Mill-Stone	Large M/S	Total
Diameter (mm)			250-524	250-524	525-649	>650	
Total	1	10	36	67	1	-	115
Percentage	1%	9%	31%	58%	1%	-	100%

Catalogue

No 1: 'Traprain Law' type hand quern - Upper Stone

Description: 40-45% fragment, broken radially: c.60% of the grinding surface ("G/S") has been removed: modest damage to G/S edge and hopper collar: The upper surface is parallel to the G/S, finished smoothly, with a hopper collar 46mm wide and 20mm high: Outside the collar is a 80mm long, 20mm wide groove adjacent to the hypothetical handle slot: the hopper is steeply conical, with an insert (15mm x 15mm and 5mm deep) for a rynd in mid-face: The edge is vertical: The surviving G/S is smooth, flat for its outer 90mm and concave (est 20mm).

Lithology: Well sorted, fine to medium grained sandstone: Millstone Grit

Dimensions: Diameter 355mm: Height Rim c70mm, collar 77-85mm: Hopper width c.80mm, depth 70mm:

Feed-Pipe ("F/P") diam 70mm: Weight 5.5kg (Est intact 13kg): YQS 8101: Section 8.

Comments: Standard quern size: Moderate usage – est 50-60% worn:

No 2: 'Traprain Law' type hand quern - Upper Stone

Description: 30% fragment in two joining pieces: Upper surface is parallel to the G/S and is nearly pecked: The hopper is concave, with a 30mm wide, 7mm high collar and with a rynd indent set into it (40mm wide, 20mm high, 5mm deep). Its edge is vertical, with a rounded top: The G/S is flat, was originally pecked but is now worn. It has a single shallow groove extending from the feed-pipe base (80mm long, 17mm wide, 3mm deep), which is roughly in-line with the rynd-slots.

Lithology: Fine grained sandstone

Dimensions: Diameter 360mm: Height rim 75mm, collar 84mm: Hopper width c.120mm, depth 35mm: F/P diam 80mm: Weight 5.73kg (Est intact 19kg): YQS 8102: Section 14.

Comments: Standard sized quern: Lightly worn – est 5-25% wear: Absence of a radial handle slot in upper surface is to be expected, as they are normally at right angles to the rynd-slots

No 3: 'Traprain Law' type hand quern - Upper Stone

Description: 25% fragment: Broken by two opposed chordal removals, then split in two: Upper surface is parallel to the G/S: It has a broad hopper collar (69mm wide, 15mm high) and its outer area is slightly domed, with linear tooling: The edge is vertical: G/S is concave (c.20mm) with a worn, pecked surface

Lithology: Fine grained sandstone – possibly MSG

Dimensions: Diameter 425mm: Height Rim 55mm, collar 80mm: Hopper width c.100mm: F/P doesn't survive, bur <80mm diam. Weight 4.62kg (est intact 19kg): YQS 8103: Section 16

Comments: Standard sized quern: Wear estimate is 50% used.

No 4: Disc Quern – Upper Stone

Description: 23% fragment: Broken radially: Upper surface is flat and level, with decorative, faint. grooves (12mm apart and 1mm deep), based on a complex harp pattern: There is no hopper and a triangular rynd-slot (30mm long, >25mm max width and 20mm max depth) is set into the top of the F/P. The edges are dressing vertically, emulating the *striae* on imported lava querns: G/S is flat, well-worn (and probably concave), with two set of straight harps (of a 6 harp pattern) which rotated anti-clockwise.

Lithology: Dark red, fine grained sandstone

Dimensions: Diameter c.360mm: Height Rim 55mm, centre 55mm: Weight 3.164kg (est intact 13.5kg): YQS 8121: Gap 2:

Comments: Estimated wear is 55-75%: Most of its features are derived from imported lava querns. Similar examples from Castleford and Catterick come from late 1st – 2nd century AD contexts.

No 5: Disc Quern – Upper Stone

Description: cc.35% fragment, with a chordal and a radial break: Upper surface is flat and peck-dressed, as is the vertical edge: F/P is off-centre by c.10mm: Rynd-slot (25mm wide, 15mm high, 7mm deep) is set into the conical hopper. G/S is concave (10-15mm), worn smooth, with the outer 70mm flat.

Lithology: Medium grained sandstone, with sparse quartz pebbles 10mm diam: Millstone Grit

Dimensions: Diameter 360mm: Height rim 60mm, centre 68mm: Hopper width 90mm, depth 50mm: F/P diam c.55mm: Weight 5.0kg (est intact 14kg): YQS 8120: Section 23

Comments: Estimated wear is 45-65%.

No 6: Disc Quern – Upper Stone

Description: c.10% rim fragment: Upper surface is smoothly finished flat: Edge is vertical: G/S is flat, with poorly executed harp grooves (probably from a 6 harp pattern) which rotated anti-clockwise.

Lithology: Fine grained sandstone (similar to No 8)

Dimensions: Diameter c.400mm: Height rim 42mm, centre <37mm: Weight 1.208kg (est intact 12kg): YQS 8111: Section 7.

Comments: Estimated wear is 85%.

No 7: Disc Quern – Upper Stone

Description: .20% rim fragment, with a chordal and a radial break: Upper surface is gently domed, dressed smooth, with no hopper: the edge is slightly curved: G/S is slightly concave (2mm) and peck-dressed with a linear trend.

Lithology: Grey, fine grained sandstone – possibly MSG

Dimensions: Diam 400mm: Height rim 50mm, centre 45mm: F/P diam c.60mm: Weight 3.066kg (est intact 15kg): YQS 8115: Section 22.

Comments: Estimated wear is 65-80%

No 8: Disc Quern – Upper Stone

Description: 10% rim fragment: Upper surface is flat and neatly pecked: The edge is vertical and smoothly finished: G/S is flat, with two harps of a 6-harp pattern (straight grooves, 14mm apart, 3-4mm wide, 2-3mm deep), which rotated anti-clockwise.

Lithology: Grey, fine grained sandstone (like No 6)

Dimensions: Diameter c.400mm: Height rim 50mm, centre <43mm: Weight 1.348kg (est intact 13kg): YQS 8110: Section 2/

Comments: Estimated wear 70-75%:

No 9: Disc Quern – Upper Stone

Description: 17% fragment: broken radially, with 100% removal of G/S edge: Distinctive ‘bagel’ profile, with a pecked upper surface and edge, a convex hopper into a very wide F/P and an atypical radial pattern of grooves on its flat G/S: the grooves are 20-25mm apart, 6mm wide, 2mm deep, separated by shorter (40-80mm long) grooves extending from the G/S edge. Such a pattern has no preferred direction of rotation.

Lithology: Light brown, fine grained sandstone

Dimensions: Diameter 450mm: Height 90mm: Hopper width 200mm, depth 69mm, F/P diam 130mm: Weight 4.539kg (est intact 27kg)L YQS 8113: Section 8.

Comments: Estimated wear 25-35%: Deliberate removal of G/S edge is normally associated with non-Roman decommissioning routines: The wide F/P and rare radial grooves (only 10 examples recorded by YQS) both suggest this quern was used differently from other hand querns (perhaps for cereal de-husking or malt grinding?)

No10: Disc Quern – Lower Stone

Description: 30-40% core fragment, in two joining pieces: Total (thus deliberate) removal of G/S edge: G/S is flat and convex (10°), with a 6 harp pattern of grooves, for a top stone rotating anti-clockwise.: The base is flat and neatly pecked.

Lithology: Fine grained sandstone

Dimensions: Diameter >300mm (Est 400-450mm): Height rim <95mm, centre 120mm: Perforated eye diameter: top 40mm, minimum 20mm, base 55mm: Weight 9kg (est intact 23-33kg): YQS 8107: Section 23 (large frag) + Section 28 (small frag).

Comments: Extent of usage, only c.25% worn: From the small minimum perforation and an estimated rim height of 90mm, the intact diameter is likely to be between 400-450mm. If it has suffered ancient damage, the complete removal of the G/S edge would be a non-Roman trait. However, the resulting roughly rectangular shape may be the result of modification by the wall-builders (but no other similar quern modification has been recorded).

No 11: Disc Quern – Lower Stone

Description: c.50% fragment, broken across its diameter, with 25% of its basal edge damaged: G/S is flat and convex, with a worn, pecked surface: the edge varies between vertical and in-turned: The 'Eye' is hour-glass shape, having been worked from opposing faces: The base is roughly dressed flat.

Lithology: Fine grained sandstone – possibly MSG

Dimensions: Diameter 330mm: Height rim 75mm, centre 90mm: Perforation diam: top 40mm, minimum 15-20mm, base 45mm: Weight 6.0kg (Est intact 12kg): YQS 8118: Section 7.

Comments: Extent of usage: the light weight suggests 85% used, but rim thickness only indicates 25% wear. This disagreement may be linked to it being an atypically small disc quern – less than 2% of the YQS archive are less than 350mm diameter.

No 12: Disc Quern – Lower Stone

Description: c.10% rim fragment: G/S is flat and smooth: Edge is vertical: Base is a roughly finished dome.

Lithology: Grey, fine grained sandstone (possibly MSG)

Dimensions: Diameter c.380mm: Height rim 45mm, centre >75mm: Weight 1.419kg (est intact 14kg): YQS 8116: Section 25.

Comments: Extent of wear is estimated at 80%: It is unlikely to be a fragment from a bun-shaped beehive as they are normally thicker.

No 13: Disc Quern – Lower Stone

Description: 10-15% rim fragment: G/S is flat, with two harps (of a 6-harp pattern) for rotating anti-clockwise, with straight grooves, 16mm apart, 3mm wide and 2mm deep: The vertical edge is dressed smooth: the outer 50mm of the base is smooth and flat, with the (assumed) concave interior area is more roughly worked.

Lithology: Fine grained sandstone, possibly MSG

Dimensions: Diameter 400-450mm: Height rim 52mm, centre <42mm: Weight 1.76kg (est intact 16kg): YQS 8109: Unstratified (from the spoil-heap)

Comments: Extent of wear is 70-80% used.

No 14: Disc Quern – Lower Stone

Description: 47% fragment, broken across a diameter, with c..40% of the G/S edge nibbled: G/S is slightly concave (5mm), neatly pecked, with the outer 80mm flat: outer edge was originally vertical: the base was flat and smoothly finished.

Lithology: Reddish-brown, fine grained sandstone

Dimensions: Diameter c.420mm: Height rim 60-65mm, centre 55-60mm: Perforation diameter (top 35mm, minimum 15mm and oval base 60-130mm): Weight 10kg (est intact 21kg): YQS 8108: Section 26

Comments: Extent of wear is 50-60% used:

No 15: Disc Quern – Lower Stone

Description: 47% fragment, broken across a diameter and 20% of G/S edge removed: G/S is slightly convex, worn smooth: the peck-dressed edge is vertical: the 'eye' is hour-glass, worked from both faces: the base is roughly dressed flat

Lithology: Finely grained sandstone

Dimensions: Diameter 430mm: Height rim 80-90mm, centre 100mm: Perforation diameter (top 46mm, minimum 20mm, base 35mm: Weight 13.5kg (est intact 29kg): YQS 8114: Section 15

Comments: Extent of wear 25-35%:

No 16: Disc Quern – Lower Stone

Description: 17% fragment, broken radially, with c.40% of G/S edge removed and none of its 'eye' surviving: G/S has its outer 120mm flat, with two sets of neat, linear harps (from a 6-harp pattern) rotating anti-clockwise: the harps stop at a 15mm wide, 2mm deep 'distribution groove' of 180mm diameter: the smoothly finished edges are straight, the base is pecked concave towards the 'eye'.

Lithology: Fine grained sandstone, possibly MSG

Dimensions: Diameter c.450mm: Height rim 75mm, centre <65mm: Eye <80mm: Weight 4.395kg (est intact 26kg): YQS 8104: Section 23

Comments: Extent of wear 50%: This is the only quern with a groove to evenly distribute the feedstock over the G/S. Being located at 40% of the overall diameter, it is in the expected position (37% +/-7%)

No 17: Disc Quern – Lower Stone

Description: 17% fragment, broken radially: G/S is almost flat, with two sets of curving harps (from a 6-harp pattern) rotating anticlockwise (grooves 15mm apart, 4mm wide, 2mm deep): vertical edge and an unevenly flat base.

Lithology: Fine grained sandstone (possibly MSG)

Dimensions: Diameter c.450mm: Height rim 75mm, centre 80mm: Perforation diameter est 30-40mm: Weight 5.686kg (est intact 31.5kg): YQS 8105: Section 8

Comments: Extent of wear 35-45%: Nos 9, 17 & 18 are the only 'Large' size querns in the assemblage.

No 18: Disc Quern – Lower Stone

Description: 20% fragment, roughly broken across a diameter and halved, with no 'eye' remaining: G/S is gently concave (10-15mm) with a peck-dressed surface with some linear tooling: Vertical edge and a flat, roughly dressed base.

Lithology: Grey, fine grained sandstone (possibly MSG)

Dimensions: Diameter c.459mm: Height rim 85mm, centre >95mm: Weight 7.5kg (est intact 37kg): YQS 8119: Section 16.

Comments: Extent of use: 20-25% worn:

No 19. Probable Beehive Base Rough-out

Description: 19% fragment, broken roughly radially, with no evidence of a spindle hole or a perforation in its central area: the potential G/S has been dressed flat (with a 10mm chisel?), but no rotary wear is evident: the sides are vertical, neatly dressed smooth: The base is an apparently un-worked boulder surface, somewhat domed.

Lithology: Fine grained sandstone

Dimensions: Diameter estimated at 300-350mm: Height rim 90mm, centre >120mm: Weight 5.0 (est intact 26kg): YQS 8122: Section 23.

Comments: No evidence of use: Its weight and dimensions are within the expected range of a beehive base.

No 20: Disc Rough-out – Probable Lower Stone

Description: 25% fragment – chordal fracture: ‘Upper’ surface peck- dressed, along natural bedding planes, but with no evidence of rotary wear: Edge is drum-shaped and peck-dressed: ‘Base’ is flat, retaining its bedding planes plus un-worked features, with some peck-dressing.

Lithology: Grey, fine grained sandstone – possibly MSG

Dimensions: Diameter 400mm (+/-25mm): Height rim between 115-125mm, Weight 8.5kg (est intact 34kg): YQS 8112: Section 15.

Comments: As the max rim thickness previously recorded was 110mm, and the max estimated weight was 35kg, this stone is more likely to be a rough-out than a barely-used quern.

No 21: Disc Rough-out – Probable Lower Stone

Description: c.95% survival, with a chordal removal of c.15% G/S edge: ‘Upper’ surface has been gently domed (20mm high) using linear tooling towards the centre, where there are two conical pits (8mm diam, 8mm deep) and 20mm apart: the edges are roughly finished vertical: base is hammer dressed flat.

Lithology: Fine grained sandstone

Dimensions: Diameter 400-410mm, Height rim c.100mm, centre 120mm: Weight 28kg (est intact 30kg): YQS 8124: Section 24

Comments: Assumed to be a lower stone from the convex ‘upper’ surface and the flat ‘base’, as no Roman querns from the site have domed upper surfaces. However, as it is unusually complete and less abraded than the other fragments, it could be a post-Roman domed upper stone. No parallels are known for the two central pits – they are presumed to be the initial stage for a central perforation.

No 22: Disc Rough-out – Probable Lower Stone

Description: 40-45% fragment, roughly broken across a diameter, with an edge fracture: The ‘upper’ surface is roughly finished (+/-5mm) and slightly domed – no rotary wear: the edges are neatly picked vertical: ‘Base’ is roughly dressed flat, with a curved rim.

Lithology: Fine grained sandstone

Dimensions: Diameter 430mm: Height rim 95mm, centre 110mm: Weight 13.5kg (est intact 32kg): Yqs 8123: Section 24.

Comments: If manufacture had progressed to perforation, the expected size of 40mm (+/- 30mm) hole should have been visible – so it is assumed to be un-perforated.

No 23: Possible Pot Quern Upper Rough-out

Description: 27% fragment, roughly quartered: ‘upper’ surface was slightly dome-shaped, using quite coarse 15mm diameter, 3mm deep pecking, but no rotary wear is evident: the edge is neatly finished and at 10° to the vertical: the base is also domed, with a smooth finish.

Lithology: Light brown, fine grained sandstone, with probable fossil burrow holes.

Dimensions: Diameter 250mm: Height rim 75mm, centre 90mm: Weight 2.069kg, (est intact 7.5kg): YQS 8117: Section 10.

Comments: An unusual item, as its diameter is well below the range of Roman disc querns. It is most likely to be a medieval pot quern upper stone. At Wharram Percy, Watt (2004, 220) considered diameters of 220 & 260mm were indicative of pot quern uppers, which have earliest dates around the 12th century AD. Alternative, but rejected, options include:

a) Saddle Quern lower stone – no recognisable G/S, b) miniature/ toy quern – rare and usually smaller.