

Table D.6 Summary of historic case history data on vibration levels measured during rotary bored piling (including casing dollies)

Ref. no.	Year and location	Soil conditions	Pile dimensions	Mode	Measured peak particle velocity (PPV) at various plan distances						Remarks	
					Theoretical energy per blow	Plan distance	PPV	Plan distance	PPV	Plan distance		PPV
					kJ	m	mm·s ⁻¹	m	mm·s ⁻¹	m		mm·s ⁻¹
100 ♦	1974 London W6	Fill/gravel/London clay	N/R	Driving casing		7	3.2					Horizontal
				With 3 t dolly		7	1.0					Vertical
101	1981 London EC3	Fill/dense ballast/London clay	1 050 mm ϕ	Augering		20	0.05					Listed building nearby
				Auger hitting base of hole		20	0.23					
102	1982 Cheltenham (Glos.)	Fill/wet sand/lia clay	900 mm ϕ	Augering		9	0.2					Listed building adjacent to site
				Hammering casing with Kelly bar		9	0.8					
103	1983 Romford (Greater London)	Fill clay	350 mm ϕ 14.5 m depth	Augering		10	0.38	20	0.3	30	0.03	
				Dollying casing	11.8	10	1.1	20	0.55			2 t dolly
				Auger hitting base of hole		10	0.96					
				Spinning off		10	0.57	20	0.44			
104	1985 London W1	Fill/sand/clay	500 mm ϕ	Augering		10	0.4	15	0.1	26	0.02	
				Auger hitting base of hole		14	0.3	26	0.1			
				Mudding in		10	0.3	14	0.2			
				Spinning off		10	0.3					
				Dollying casing	11.8	10	1.0	14	0.8			2 t dolly
105	1985 St. Albans (Herts)	Sands and gravels over chalk	600 mm ϕ 12 m depth	Augering		3.5	0.23	8	0.04			
				Auger hitting base of hole		3.5	2.4	8	1.7			
				Spinning off		6	0.08	8	0.06			

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106	1985 Portland (Dorset)	6 m of soft ground over rock	600 mm ϕ 7 m depth	Augering		5	0.54					Sensitive equipment in adjacent building
				Surging casing		5	0.36					
				Twisting in casing		5	0.22					
				Spinning off		5	0.42					
				Boring with rock auger		5	0.43					
107	1985 Uxbridge (Greater London)	Fill including pockets of gravel over London clay	350 mm ϕ 7 m depth	Augering		5.5	0.13					Preboring for a driven pile

Table D.7 Summary of historic case history data on vibration levels measured during tripod bored piling

Ref. no.	Year and location	Soil conditions	Pile dimensions	Mode	Measured peak particle velocity (PPV) at various plan distances						Remarks	
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					kJ	m	mm·s ⁻¹	m	mm·s ⁻¹	m		mm·s ⁻¹
C1 ♦	1971 London WC2	Overburden over London clay	N/R	Driving casing	N/R	1	12.5					
C2 ♦	1971 London SW1	Sand and gravel over London clay	500 mm ϕ 17 m depth	N/R	N/R	11	2.6	42	0.31			
C3 ♦	Bury (Greater Manchester)	Sand and gravel/ soft silty clay/hard glacial till	300 mm ϕ	N/R	N/R	15	4.0					

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Abingdon	West Drayton	
Oxon OX14 5BZ	Careys New Homes	
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Micro Drainage	Source Control 2016.1	

Summary of Results for 100 year Return Period (+30%)

Half Drain Time : 55 minutes.

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max E Outflow (l/s)	Max Volume (m³)	Status
15 min Summer	99.412	0.412	0.0	5.0	5.0	20.3	O K
30 min Summer	99.503	0.503	0.0	5.0	5.0	24.7	O K
60 min Summer	99.539	0.539	0.0	5.0	5.0	26.5	O K
120 min Summer	99.522	0.522	0.0	5.0	5.0	25.7	O K
180 min Summer	99.480	0.480	0.0	5.0	5.0	23.6	O K
240 min Summer	99.429	0.429	0.0	5.0	5.0	21.1	O K
360 min Summer	99.330	0.330	0.0	5.0	5.0	16.2	O K
480 min Summer	99.253	0.253	0.0	5.0	5.0	12.4	O K
600 min Summer	99.196	0.196	0.0	5.0	5.0	9.6	O K
720 min Summer	99.157	0.157	0.0	5.0	5.0	7.7	O K
960 min Summer	99.119	0.119	0.0	4.6	4.6	5.8	O K
1440 min Summer	99.092	0.092	0.0	3.5	3.5	4.6	O K
15 min Winter	99.468	0.468	0.0	5.0	5.0	23.1	O K
30 min Winter	99.572	0.572	0.0	5.0	5.0	28.2	O K
60 min Winter	99.619	0.619	0.0	5.0	5.0	30.3	O K
120 min Winter	99.588	0.588	0.0	5.0	5.0	28.9	O K
180 min Winter	99.525	0.525	0.0	5.0	5.0	25.9	O K
240 min Winter	99.452	0.452	0.0	5.0	5.0	22.2	O K
360 min Winter	99.296	0.296	0.0	5.0	5.0	14.6	O K
480 min Winter	99.191	0.191	0.0	5.0	5.0	9.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	128.285	0.0	23.5	17
30 min Summer	84.226	0.0	30.9	31
60 min Summer	52.662	0.0	38.7	52
120 min Summer	31.800	0.0	46.7	84
180 min Summer	23.353	0.0	51.5	120
240 min Summer	18.644	0.0	54.8	154
360 min Summer	13.543	0.0	59.7	216
480 min Summer	10.792	0.0	63.4	274
600 min Summer	9.043	0.0	66.4	330
720 min Summer	7.823	0.0	69.0	384
960 min Summer	6.219	0.0	73.1	494
1440 min Summer	4.493	0.0	79.2	736
15 min Winter	128.285	0.0	26.4	17
30 min Winter	84.226	0.0	34.6	31
60 min Winter	52.662	0.0	43.3	56
120 min Winter	31.800	0.0	52.3	90
180 min Winter	23.353	0.0	57.6	130
240 min Winter	18.644	0.0	61.4	166
360 min Winter	13.543	0.0	66.9	228
480 min Winter	10.792	0.0	71.0	280

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Summary of Results for 100 year Return Period (+30%)

Storm Event	Max Level (m)	Max Depth (m)	Max Infiltration (l/s)	Max Control (l/s)	Max Σ Outflow (l/s)	Max Volume (m³)	Status
600 min Winter	99.132	0.132	0.0	4.9	4.9	6.5	O K
720 min Winter	99.113	0.113	0.0	4.4	4.4	5.6	O K
960 min Winter	99.093	0.093	0.0	3.5	3.5	4.6	O K
1440 min Winter	99.075	0.075	0.0	2.6	2.6	3.7	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
600 min Winter	9.043	0.0	74.4	326
720 min Winter	7.823	0.0	77.2	378
960 min Winter	6.219	0.0	81.9	498
1440 min Winter	4.493	0.0	88.7	736

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Model Details

Storage is Online Cover Level (m) 100.000

Cellular Storage Structure

Invert Level (m) 99.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	51.8	51.8	0.700	0.0	73.4
0.600	51.8	73.4			

Hydro-Brake Optimum® Outflow Control

Unit Reference MD-SHE-0111-5000-0610-5000
Design Head (m) 0.610
Design Flow (l/s) 5.0
Flush-Flo™ Calculated
Objective Minimise upstream storage
Application Surface
Sump Available Yes
Diameter (mm) 111
Invert Level (m) 99.000
Minimum Outlet Pipe Diameter (mm) 150
Suggested Manhole Diameter (mm) 1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.610	5.0
Flush-Flo™	0.197	5.0
Kick-Flo®	0.436	4.3
Mean Flow over Head Range	-	4.2

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake Optimum® as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	3.9	1.200	6.8	3.000	10.5	7.000	15.8
0.200	5.0	1.400	7.4	3.500	11.3	7.500	16.3
0.300	4.9	1.600	7.8	4.000	12.1	8.000	16.9
0.400	4.6	1.800	8.3	4.500	12.8	8.500	17.4
0.500	4.6	2.000	8.7	5.000	13.4	9.000	17.9
0.600	5.0	2.200	9.1	5.500	14.1	9.500	18.4
0.800	5.7	2.400	9.5	6.000	14.7		
1.000	6.3	2.600	9.9	6.500	15.2		