

APPENDIX 10.3: DEMOLITION AND CONSTRUCTION NOISE AND VIBRATION ASSESSMENT

Demolition and Construction Noise Assessment

The potential for a significant effect to occur has been assessed based on threshold values determined by using the ABC Method set out in Annex E3 of BS 5228-1:2009+A1:2014. An extract describing this method is provided in Table 10.3.1.

Table 10.3.1: BS 5228 ABC Categories

Assessment category and threshold value period	Threshold Value (dB)		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23.00-07.00)	45	50	55
Evenings and weekends ^{D)}	55	60	65
Daytime (07.00-19.00) and Saturdays (07.00-13.00)	65	70	75

NOTE 1: A potential significant effect is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq,T}$ noise level for the period increase by more than 3 dB due to site noise.

NOTE 3: Applied to residential receptors only.

^{A)} Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

^{B)} Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

^{C)} Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

^{D)} 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

The site noise level determined at the nearest SR has been compared to the threshold value relevant to the SR location. The site noise level has been predicted accounting for the source sound level, plant/activity on-time, distance to the SR and any intervening screening. Predicted noise levels are in terms of the overall 10-hour L_{Aeq} level for a 'worst case' scenario as determined at the nearest SR to noise originating from the construction works.

Each of the construction stages will include a range of operational noise generating plant. Table 8.3.2 presents a breakdown of the variety of plant assumed to operate collectively within each construction stage, together with the sound pressure level at a distance of 10 m and the origin of this source information.

Figure 10.3.2: Assumed Construction Stage Plant and Source Noise Levels

Plant	Sound Pressure Level at 10 m, dB(A)	Data Source (BS 5228-1:2009+A1:2014)	Number of Units
Site Preparation			
Tracked excavator (44t)	82.0	Table C.1 ref 12	1
Articulated dump truck	80.0	Table C.1 ref 11	1
Dozer	75.0	Table C.2 ref 1	1
Wheeled backhoe loader (8t)	68.0	Table C.2 ref 8	1
Hand-held hydraulic breaker (20 kg / 69 bar)	93.0	Table C.1 ref 7	1
Lorry 4-axle wagon	80.0	Table C.2 ref 34	1
Substructure			
Concrete mixer truck (discharging) and concrete pump (pumping)	75.0	Table C.4 ref 28	1
Vibratory tamper	63.0	Table C.4 ref 35	1
Tracked excavator (22t)	78.0	Table C.2 ref 3	1
Articulated dump truck (25t)	81.0	Table C.4 ref 1	1
Crane mounted auger	79.0	Table C.3 ref 16	1
Generator for welding	73.0	Table C.3 ref 32	1
Super Structure			
Power for site cabins- diesel generator	61.0	Table C.4 ref 76	1
Diesel generator- Power for welder	66.0	Table C.4 ref 85	1
Lorry 4-axle wagon	80.0	Table C.2 ref 34	1
Cutting concrete slabs- Hand-held circular saw (petrol)	79.0	Table C.4 ref 72	1
Mobile telescopic crane (80t)	77.0	Table C.4 ref 39	1
Gas cutter	79.0	Table C.1 ref 18	1
Landscaping			
Tracked excavator (22 tonne)	78.0	Table C.2 ref 3	1
Asphalt paver (+ tipper lorry)	75.0	Table C.5 ref 30	1
Road roller	80.0	Table C.5 ref 19	1
Power for site cabins- diesel generator	61.0	Table C.4 ref 76	1
Vibratory tamper	63.0	Table C.4 ref 35	1
Concrete mixer truck (discharging) and concrete pump (pumping)	75.0	Table C.4 ref 28	1

The predicted site noise levels and the determined threshold values at SRs for each construction stage, along with the resultant effect significance as defined in the main Chapter are summarised in Table 8.3.3 for the unmitigated scenario.

Table 10.3.3: Predicted Unmitigated Construction Noise Levels at SRs

Sensitive Receptor	Sensitivity	Construction Phase	Period	Measured Ambient Noise Level, dB $L_{Aeq,10hr}$	Ambient Noise Level Rounded to 5 dB	Category	Threshold	Predicted Construction Noise Level, dB $L_{Aeq,10hr}$	Value Over Threshold, dB	Significance
SR A	High	Demolition	Daytime	65	65	B	70	63	-7	Negligible
		Substructure						65	-5	Negligible
		Super Structure						65	-5	Negligible
		Landscaping						54	-16	Negligible
SR B	High	Demolition	Daytime	65	65	B	70	59	-11	Negligible
		Substructure						60	-10	Negligible
		Super Structure						60	-10	Negligible
		Landscaping						49	-21	Negligible
SR C	High	Demolition	Daytime	65	65	B	70	58	-12	Negligible
		Substructure						60	-10	Negligible
		Super Structure						60	-10	Negligible
		Landscaping						49	-21	Negligible
SR D	High	Demolition	Daytime	67	65	B	70	70	0	Negligible
		Substructure						71	1	Negligible
		Super Structure						71	1	Negligible
		Landscaping						61	-9	Negligible

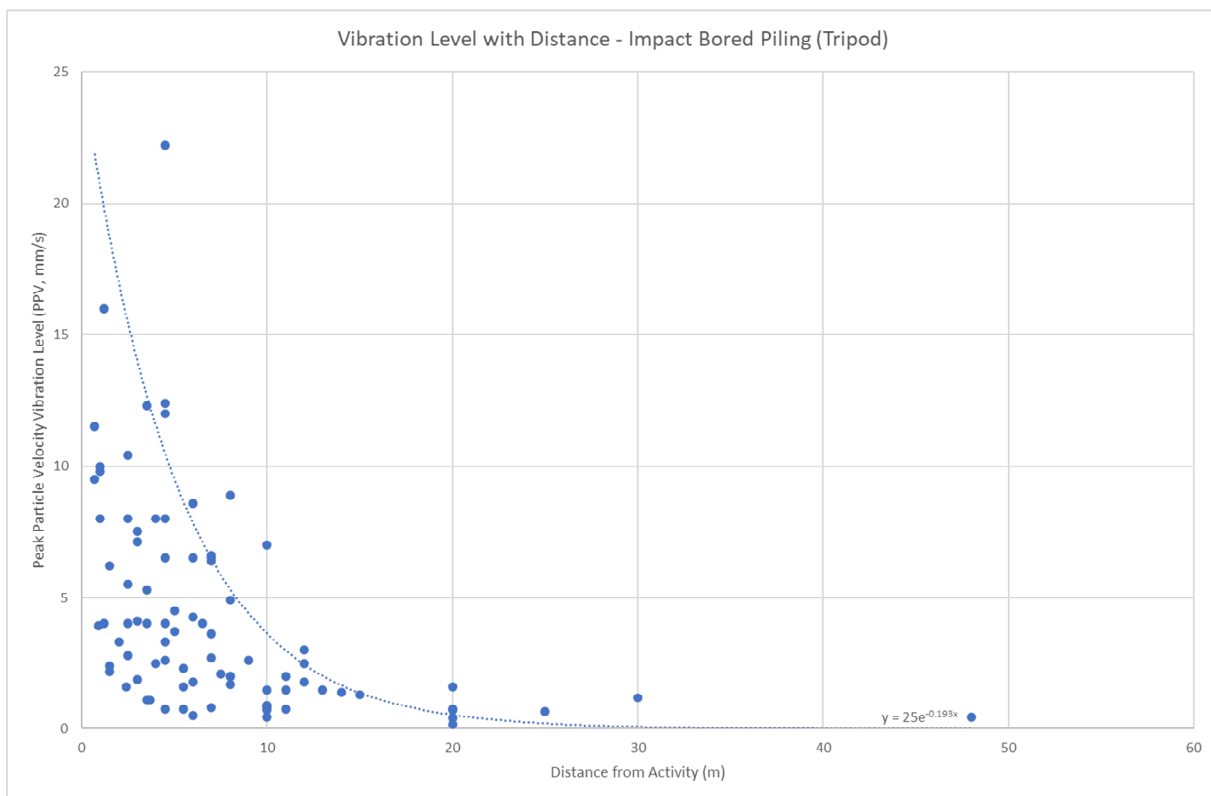
Demolition and Construction Vibration Assessment

BS 5228-2:2009+A1:2014 has been referred to for historic levels of vibration from piling activities associated with the construction of the Proposed Development.

The charts shown in Figures 10.3.1, 10.3.2 and 10.3.3 show historic measurements of vibration at specific distances from different piling activities, and have been used to define trendlines to predict the level of vibration at the SRs.

The figures show the trendlines for impact bored piling, driven sheet steel and rotary bored piling respectively, based on data within BS 5228-2.

Figure 10.3.1: Historic Measurements of Vibration from Impact Bored Piling



The scatter plot displays the relationship between the distance from the activity and the peak particle velocity (PPV). The data points are represented by blue dots, and a fitted curve is shown as a dotted line. The curve starts at a PPV of approximately 20 mm/s at a distance of 0 meters and decays exponentially towards zero as the distance increases. The equation for the fitted curve is $y = 20e^{-0.031x}$.

Distance from Activity (m)	Peak Particle Velocity (PPV, mm/s)
0	20
0	15
0	10
0	9
0	4
0	2
0	1
5	4
5	2
10	1
15	1
20	1
25	1
30	1
35	1
40	1
45	1
50	1
55	1
60	1
65	1
70	1
75	1
80	1
85	1
90	1
95	1
100	1
105	1
110	1
115	1
120	1
125	1
130	1
135	1
140	1
145	1
150	1
155	1
160	1
165	1
170	1
175	1
180	1
185	1
190	1
195	1
200	1
205	1
210	1
215	1
220	1
225	1
230	1
235	1
240	1
245	1
250	1
255	1
260	1
265	1
270	1
275	1
280	1
285	1
290	1
295	1
300	1
305	1
310	1
315	1
320	1
325	1
330	1
335	1
340	1
345	1
350	1

The scatter plot displays the relationship between the distance from the activity and the peak particle velocity (PPV) for rotary bored piling. The x-axis represents the distance in meters, ranging from 0 to 35. The y-axis represents the PPV in mm/s, ranging from 0 to 3.5. A fitted curve is shown with the equation $y = 3.5e^{-0.178x}$.

Distance from Activity (m)	Peak Particle Velocity (PPV, mm/s)
3.5	0.25
3.5	2.4
5.0	0.25
5.0	0.40
5.0	0.55
6.0	0.15
7.0	0.10
7.5	1.00
8.5	0.05
8.5	0.08
8.5	1.70
8.5	3.20
9.0	0.20
9.5	0.80
10.0	0.30
10.0	0.40
10.0	0.55
10.0	0.95
10.0	1.10
14.0	0.20
14.0	0.30
14.0	0.80
16.0	0.10
20.0	0.05
20.0	0.25
20.0	0.45
20.0	0.55
26.0	0.05
26.0	0.10
30.0	0.02

The predicted vibration levels from the unmitigated activities are based on the impact bored piling and driven sheet steel piling methods, whichever is greater. Predicted mitigated vibration levels are based on the rotary bored piling method. Table 10.3.5 shows the predicted vibration levels for each piling method.

Table 10.3.5: Predicted Construction Vibration Levels at SRs

Sensitive Receptor	Sensitivity	Period	Piling Method	Predicted Construction Vibration Level, PPV, mm/s	Significance
SR A	High	Daytime	Impact Bored	0.00	Neutral
			Driven Sheet Steel	4.66	Moderate
			Rotary Bored	0.00	Neutral
SR B	High	Daytime	Impact Bored	0.00	Neutral
			Driven Sheet Steel	1.84	Minor
			Rotary Bored	0.00	Neutral
SR C	High	Daytime	Impact Bored	0.00	Neutral
			Driven Sheet Steel	1.57	Minor
			Rotary Bored	0.00	Neutral
SR D	High	Daytime	Impact Bored	0.30	Negligible
			Driven Sheet Steel	9.80	Major
			Rotary Bored	0.06	Neutral
SR E	Low	Daytime	Impact Bored	0.53	Negligible
			Driven Sheet Steel	10.76	Major
			Rotary Bored	0.10	Neutral