

Appendix 6.7 Construction Ground-borne Noise Calculation - Sample Calculation (TBM Induced Ground-Borne Noise)

NSR No.	GN3																			Chainage	140+320	
Location	Yaumati Catholic Primary School (Hoi Wang Road)																			Calculated Distance (m)	5	
		1/3 Octave Band Center Frequency (Hz)																				
		6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		
TBM Calculation																						
FDL	dB re 1N/m ^{1/2}	66.9	70.9	68.9	78.9	62.9	55.9	63.9	60.9	65.9	60.9	63.9	67.9	67.9	81.9	82.9	74.9	77.9	67.9	68.9		
LSR	dB re 1(nm/s)/(N/m ^{1/2})	18.6	21.2	25.0	28.4	30.9	32.4	30.8	30.1	28.8	26.7	22.6	27.9	25.4	20.4	5.5	7.4	3.7	-0.1	3.3		
BCF	dB	-4.4	-4.5	-5.0	-5.4	-6.0	-6.7	-7.3	-8.0	-9.0	-10.1	-11.1	-12.0	-12.9	-13.6	-14.1	-14.3	-14.2	-12.6	-11.5		
BVR - Amplification	dB	1.0	2.0	3.0	3.8	5.0	6.0	6.0	6.0	6.0	5.8	5.4	5.2	5.0	4.8	4.0	3.0	2.0	1.0	0.7		
BVR - Floor Attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
CTN	dB	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0		
SAF	dB	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Leq	dB	65.1	72.6	74.9	88.7	75.8	70.6	76.5	72.0	74.8	66.3	63.8	72.0	68.4	76.5	61.3	54.0	52.4	39.3	44.4		
Total Predicted Noise Level																						
Leq	dBA	62																				

NSR No.	GN7																			Chainage	139+280	
Location	Tai Fung Building (Block F) Cosmopolitan Estates																			Calculated Distance (m)	36	
		1/3 Octave Band Center Frequency (Hz)																				
		6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		
TBM Calculation																						
FDL	dB re 1N/m ^{1/2}	111.9	107.9	106.9	107.9	106.9	98.9	94.9	93.9	92.9	84.9	84.9	81.9	81.9	81.9	80.9	81.9	88.9	86.9	86.9		
LSR	dB re 1(nm/s)/(N/m ^{1/2})	-2.8	-8.8	1.6	1.6	5.6	-3.4	-4.4	-4.7	-0.2	1.5	3.9	1.5	6.8	3.9	-1.5	7.2	7.6	8.1	9.2		
BCF	dB	-4.4	-4.5	-5.0	-5.4	-6.0	-6.7	-7.3	-8.0	-9.0	-10.1	-11.1	-12.0	-12.9	-13.6	-14.1	-14.3	-14.2	-12.6	-11.5		
BVR - Amplification	dB	1.0	2.0	3.0	3.8	5.0	6.0	6.0	6.0	6.0	5.8	5.4	5.2	5.0	4.8	4.0	3.0	2.0	1.0	0.7		
BVR - Floor Attenuation	dB	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		
CTN	dB	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0		
SAF	dB	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Leq	dB	86.8	77.6	87.5	88.9	92.5	75.8	70.2	68.2	70.7	63.1	64.1	57.6	61.8	58.0	50.3	58.8	65.4	64.4	66.4		
Total Predicted Noise Level																						
Leq	dBA	65																				

NSR No.	GN31																			Chainage	123+470	
Location	DD110 LOT 482, Wang Toi Shan																			Calculated Distance (m)	19	
		1/3 Octave Band Center Frequency (Hz)																				
		6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		
TBM Calculation																						
FDL	dB re 1N/m ^{1/2}	111.9	107.9	106.9	107.9	106.9	98.9	94.9	93.9	92.9	84.9	84.9	81.9	81.9	81.9	80.9	81.9	88.9	86.9	86.9		
LSR	dB re 1(nm/s)/(N/m ^{1/2})	-2.8	-8.9	1.6	1.6	5.6	-3.4	-4.4	-4.7	-0.2	1.5	3.8	1.4	6.8	3.9	-1.6	7.2	7.6	8.0	9.2		
BCF	dB	1.6	-2.0	-4.3	-5.8	-6.8	-7.5	-7.9	-8.2	-8.4	-8.4	-8.2	-7.9	-7.6	-7.1	-6.6	-5.8	-5.0	-4.0	-2.4		
BVR - Amplification	dB	1.0	2.0	3.0	3.8	5.0	6.0	6.0	6.0	6.0	5.8	5.4	5.2	5.0	4.8	4.0	3.0	2.0	1.0	0.7		
BVR - Floor Attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
CTN	dB	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0		
SAF	dB	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Leq	dB	94.7	82.1	90.2	90.5	93.7	77.0	71.6	70.0	73.3	66.8	68.9	63.7	69.1	66.5	59.8	69.3	76.5	74.9	77.4		
Total Predicted Noise Level																						
Leq	dBA	80																				

NSR No.	GN33																			Chainage	122+830	
Location	348 Tsat Sing Kong																			Calculated Distance (m)	27	
		1/3 Octave Band Center Frequency (Hz)																				
		6.3	8	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		
TBM Calculation																						
FDL	dB re 1N/m ^{1/2}	66.9	70.9	68.9	78.9	62.9	55.9	63.9	60.9	65.9	60.9	63.9	67.9	67.9	81.9	82.9	74.9	77.9	67.9	68.9		
LSR	dB re 1(nm/s)/(N/m ^{1/2})	0.7	5.2	5.9	6.5	3.0	0.6	-1.9	0.2	0.7	0.7	-4.8	-4.0	-4.9	-11.6	-18.0	-12.5	-14.7	-14.8	-17.9		
BCF	dB	1.6	-2.0	-4.3	-5.8	-6.8	-7.5	-7.9	-8.2	-8.4	-8.4	-8.2	-7.9	-7.6	-7.1	-6.6	-5.8	-5.0	-4.0	-2.4		
BVR - Amplification	dB	1.0	2.0	3.0	3.8	5.0	6.0	6.0	6.0	6.0	5.8	5.4	5.2	5.0	4.8	4.0	3.0	2.0	1.0	0.7		
BVR - Floor Attenuation	dB	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
CTN	dB	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0	-27.0		
SAF	dB	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0		
Leq	dB	53.2	59.2	56.5	66.4	47.1	38.1	43.1	41.9	47.2	42.0	39.4	44.2	43.4	51.0	45.3	42.6	43.2	33.1	32.3		
Total Predicted Noise Level																						
Leq	dBA	59																				

Appendix 6.7 Construction Ground-borne Noise Calculation - Sample Calculation (PME Induced Ground-Borne Noise)

Detail Calculation Summary

NSR	Damping	no. of storey	lowest occupie d	Distance R	Leq	Operation	Leq(30 min)
GN12a	rock	8	0	95	44	Hydraulic breaker	44
GN14a	rock	8	0	27	57	Drill Rig	62
GN14b	soil	2	0	71	3	Hydraulic breaker	3
GN14c	rock	7	1	18	59	Hydraulic breaker	59
GN15	soil	2	0	235	-8	Drill Rig	-3
GN16	rock	17	2	248	26	Drill Rig	31
GN17	rock	20	4	275	20	Drill Rig	25
GN18	rock	31	4	90	36	Drill Rig	41
GN18a	rock	21	4	264	21	Hydraulic breaker	21
GN19	rock	28	1	41	51	Drill Rig	56
GN20	rock	23	1	32	53	Drill Rig	58
GN21	soil	3	0	73	2	Drill Rig	7
GN21a	soil	3	0	18	19	Hydraulic breaker	19
GN22	soil	3	0	87	1	Drill Rig	6
GN22a	soil	3	0	94	0	Hydraulic breaker	0
GN23	soil	4	0	98	7	Drill Rig	12
GN24	rock	25	1	40	51	Drill Rig	56
GN25	rock	7	1	101	41	Drill Rig	46
GN25a	soil	2	0	62	4	Drill Rig	9
GN30	soil	3	0	112	-1	Pile Rig	5
GN35	soil	1	0	82	1	Drill Rig	6

Breaker	Drill	Pile
x		
	x	
x		
x		
	x	
	x	
	x	
x		
	x	
	x	
x		
	x	
x		
	x	
	x	
		x
	x	

Detail Calculation for each NSR

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN12a	rock	0.01	3500	5.5	8	0	95
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-25	-25	-25	-25	-25	-25 dB
3	Soil Damping	-0.1	-0.2	-0.5	-0.9	-1.9	-3.7 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-13	5	17	25	34	43 dBA
8	A-weighted Noise Level at NSR	44					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN14a	rock	0.01	3500	5.5	8	0	27
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-14	-14	-14	-14	-14	-14 dB
3	Soil Damping	0.0	-0.1	-0.1	-0.3	-0.5	-1.1 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-2	16	29	37	46	57 dBA
8	A-weighted Noise Level at NSR	57					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN14b	soil	0.5	1500	5.5	2	0	71
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-22	-22	-22	-22	-22	-22 dB
3	Soil Damping	-10.3	-20.3	-40.0	-40.0	-40.0	-40.0 dB
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-28	-19	-27	-18	-9	2 dBA
8	A-weighted Noise Level at NSR	3					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN14c	rock	0.01	3500	5.5	7	1	18
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-10	-10	-10	-10	-10	-10 dB
3	Soil Damping	0.0	0.0	-0.1	-0.2	-0.4	-0.7 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	-2	-2	-2	-2	-2	-2 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-1	18	30	38	48	58 dBA
8	A-weighted Noise Level at NSR	59					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN15	soil	0.5	1500	5.5	2	0	235
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-33	-33	-33	-33	-33	-33 dB
3	Soil Damping	-34.2	-40.0	-40.0	-40.0	-40.0	-40.0 dB
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-62	-49	-37	-29	-19	-8 dBA
8	A-weighted Noise Level at NSR	-8					dBA

Appendix 6.7 Construction Ground-borne Noise Calculation - Sample Calculation (PME Induced Ground-Borne Noise)

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN16	rock	0.01	3500	5.5	17	2	248
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-33	-33	-33	-33	-33	-33 dB
3	Soil Damping	-0.3	-0.6	-1.2	-2.4	-4.8	-9.7 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	-4	-4	-4	-4	-4	-4 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-26	-7	4	11	18	25 dBA
8	A-weighted Noise Level at NSR	26					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN17	rock	0.01	3500	5.5	20	4	275
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-34	-34	-34	-34	-34	-34 dB
3	Soil Damping	-0.3	-0.7	-1.4	-2.7	-5.4	-10.7 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	-8	-8	-8	-8	-8	-8 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-31	-12	-1	6	13	19 dBA
8	A-weighted Noise Level at NSR	20					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN18	rock	0.01	3500	5.5	31	4	90
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-24	-24	-24	-24	-24	-24 dB
3	Soil Damping	-0.1	-0.2	-0.4	-0.9	-1.8	-3.5 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	-8	-8	-8	-8	-8	-8 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-21	-2	10	18	26	36 dBA
8	A-weighted Noise Level at NSR	36					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN18a	rock	0.01	3500	5.5	21	4	264
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-34	-34	-34	-34	-34	-34 dB
3	Soil Damping	-0.3	-0.6	-1.3	-2.6	-5.1	-10.3 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	-8	-8	-8	-8	-8	-8 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-30	-12	0	7	14	20 dBA
8	A-weighted Noise Level at NSR	21					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN19	rock	0.01	3500	5.5	28	1	41
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-17	-17	-17	-17	-17	-17 dB
3	Soil Damping	-0.1	-0.1	-0.2	-0.4	-0.8	-1.6 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	-2	-2	-2	-2	-2	-2 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-8	11	23	31	40	50 dBA
8	A-weighted Noise Level at NSR	51					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN20	rock	0.01	3500	5.5	23	1	32
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-15	-15	-15	-15	-15	-15 dB
3	Soil Damping	0.0	-0.1	-0.2	-0.3	-0.6	-1.2 dB
4	Building Coupling Loss	0	0	0	0	0	0 dB
5	Floor to Floor Attenuation	-2	-2	-2	-2	-2	-2 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-6	13	25	33	42	53 dBA
8	A-weighted Noise Level at NSR	53					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN21	soil	0.5	1500	5.5	3	0	73
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-22	-22	-22	-22	-22	-22 dB
3	Soil Damping	-10.6	-20.9	-40.0	-40.0	-40.0	-40.0 dB
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-28	-20	-27	-19	-9	2 dBA
8	A-weighted Noise Level at NSR	2					dBA

Appendix 6.7 Construction Ground-borne Noise Calculation - Sample Calculation (PME Induced Ground-Borne Noise)

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)	
GN21a	soil	0.5	1500	5.5	3	0	18	
Item	Description							
	Octave Band Frequency	16	31.5	63	125	250	500 Hz	
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s	
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)	
2	Distance Attenuation	-10	-10	-10	-10	-10	-10 dB	
3	Soil Damping	-2.6	-5.2	-10.3	-20.5	-40.0	-40.0 dB	
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB	
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB	
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB	
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB	
7	Octave Noise Level at NSR	-8	8	15	13	3	14 dBA	
8	A-weighted Noise Level at NSR	19						dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)	
GN22	soil	0.5	1500	5.5	3	0	87	
Item	Description							
	Octave Band Frequency	16	31.5	63	125	250	500 Hz	
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s	
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)	
2	Distance Attenuation	-24	-24	-24	-24	-24	-24 dB	
3	Soil Damping	-12.7	-24.9	-40.0	-40.0	-40.0	-40.0 dB	
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB	
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB	
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB	
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB	
7	Octave Noise Level at NSR	-32	-26	-28	-20	-11	0 dBA	
8	A-weighted Noise Level at NSR	1						dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)	
GN22a	soil	0.5	1500	5.5	3	0	94	
Item	Description							
	Octave Band Frequency	16	31.5	63	125	250	500 Hz	
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s	
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)	
2	Distance Attenuation	-25	-25	-25	-25	-25	-25 dB	
3	Soil Damping	-13.7	-26.9	-40.0	-40.0	-40.0	-40.0 dB	
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB	
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB	
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB	
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB	
7	Octave Noise Level at NSR	-34	-28	-29	-21	-11	0 dBA	
8	A-weighted Noise Level at NSR	0						dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)	
GN23	soil	0.5	1500	5.5	4	0	98	
Item	Description							
	Octave Band Frequency	16	31.5	63	125	250	500 Hz	
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s	
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)	
2	Distance Attenuation	-25	-25	-25	-25	-25	-25 dB	
3	Soil Damping	-14.3	-28.1	-40.0	-40.0	-40.0	-40.0 dB	
4	Building Coupling Loss	0	0	0	0	0	0 dB	
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB	
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB	
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB	
7	Octave Noise Level at NSR	-28	-23	-22	-14	-5	6 dBA	
8	A-weighted Noise Level at NSR	7						dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)	
GN24	rock	0.01	3500	5.5	25	1	40	
Item	Description							
	Octave Band Frequency	16	31.5	63	125	250	500 Hz	
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s	
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)	
2	Distance Attenuation	-17	-17	-17	-17	-17	-17 dB	
3	Soil Damping	0.0	-0.1	-0.2	-0.4	-0.8	-1.6 dB	
4	Building Coupling Loss	0	0	0	0	0	0 dB	
5	Floor to Floor Attenuation	-2	-2	-2	-2	-2	-2 dB	
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB	
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB	
7	Octave Noise Level at NSR	-8	11	23	31	40	51 dBA	
8	A-weighted Noise Level at NSR	51						dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)	
GN25	rock	0.01	3500	5.5	7	1	101	
Item	Description							
	Octave Band Frequency	16	31.5	63	125	250	500 Hz	
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s	
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)	
2	Distance Attenuation	-25	-25	-25	-25	-25	-25 dB	
3	Soil Damping	-0.1	-0.2	-0.5	-1.0	-2.0	-3.9 dB	
4	Building Coupling Loss	0	0	0	0	0	0 dB	
5	Floor to Floor Attenuation	-2	-2	-2	-2	-2	-2 dB	
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB	
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB	
7	Octave Noise Level at NSR	-16	3	15	23	31	40 dBA	
8	A-weighted Noise Level at NSR	41						dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)	
GN25a	soil	0.5	1500	5.5	2	0	62	
Item	Description							
	Octave Band Frequency	16	31.5	63	125	250	500 Hz	
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s	
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)	
2	Distance Attenuation	-21	-21	-21	-21	-21	-21 dB	
3	Soil Damping	-9.0	-17.8	-35.5	-40.0	-40.0	-40.0 dB	
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB	
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB	
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB	
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB	
7	Octave Noise Level at NSR	-25	-16	-21	-17	-8	3 dBA	
8	A-weighted Noise Level at NSR	4						dBA

Appendix 6.7 Construction Ground-borne Noise Calculation - Sample Calculation (PME Induced Ground-Borne Noise)

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN30	soil	0.5	1500	5.5	3	0	112
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-26	-26	-26	-26	-26	-26 dB
3	Soil Damping	-16.3	-32.1	-40.0	-40.0	-40.0	-40.0 dB
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-38	-35	-31	-22	-13	-2 dBA
8	A-weighted Noise Level at NSR	-1					dBA

NSR	Ground Type	n	c (m/s)	Ro (m)	no. of storey	lowest occupied	R (m)
GN35	soil	0.5	1500	5.5	1	0	82
Item	Description						
	Octave Band Frequency	16	31.5	63	125	250	500 Hz
	rms velocity	0.059	0.068	0.062	0.050	0.062	0.121 mm/s
1	Vibration Velocity, ref 10 ⁻⁶ mm/s	95	97	96	94	96	102 dB(V)
2	Distance Attenuation	-23	-23	-23	-23	-23	-23 dB
3	Soil Damping	-11.9	-23.5	-40.0	-40.0	-40.0	-40.0 dB
4	Building Coupling Loss	-7	-7	-7	-7	-7	-7 dB
5	Floor to Floor Attenuation	0	0	0	0	0	0 dB
5	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27 dB
6	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2 dB
7	Octave Noise Level at NSR	-31	-24	-28	-20	-10	1 dBA
8	A-weighted Noise Level at NSR	1					dBA