

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **27**  
 Name **Hong Kong Institute of Vocation Education (Kennedy Centre)**  
 Site **Ex-Police Quarters Kennedy Town**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 21 -12	5.5 21 -12	5.5 21 -12	5.5 21 -12	5.5 21 -12	5.5 21 -12	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-23	-23	-23	-23	-23	-23	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-4	15	24	29	37	48	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>48 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>53 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>55 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **28**  
 Name **Luen Tak Apartment**  
 Site **Kennedy Town Station**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 22 -12	5.5 22 -12	5.5 22 -12	5.5 22 -12	5.5 22 -12	5.5 22 -12	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-8	10	19	25	33	43	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>44 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>49 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>50 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **29**  
 Name **Kam Po Mansion**  
 Site **Kennedy Town Station (Entrance B)**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 13 -7	5.5 13 -7	5.5 13 -7	5.5 13 -7	5.5 13 -7	5.5 13 -7	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-4	15	24	29	37	48	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>48 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>54 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>55 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **30**  
 Name **Pokfield Garden**  
 Site **Kennedy Town Station**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	3	21	31	36	44	55	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>55 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>60 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>62 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. 31  
 Name The Belcher's Tower 3  
 Site University Station (Vent Shaft Z1 & Entrance C)

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 8 -3	5.5 8 -3	5.5 8 -3	5.5 8 -3	5.5 8 -3	5.5 8 -3	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	0	19	28	33	42	52	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								53 dB(A)

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	58 dB(A)		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	59 dB(A)		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. 32  
 Name 39 Hill Road  
 Site Hill Road Site (Vent Shaft Y)

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	3	21	31	36	44	55	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								55 dB(A)

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	60 dB(A)		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	62 dB(A)		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **33**  
 Name **Western Court Block 1-4**  
 Site **University Station (Entrance B1)**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 4 3	5.5 4 3	5.5 4 3	5.5 4 3	5.5 4 3	5.5 4 3	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	6	25	34	40	48	58	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>59 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>64 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>65 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **33a**  
 Name **The Kadoorie Biological Science building**  
 Site **University (Entrance A)**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 11 -6	5.5 11 -6	5.5 11 -6	5.5 11 -6	5.5 11 -6	5.5 11 -6	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-2	16	26	31	39	49	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>50 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>55 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>56 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **34**  
 Name **Kiu Shing Building**  
 Site **Sai Ying Pun Station (Entrance B3)**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	3	21	31	36	44	55	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>55 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>60 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>62 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **35**  
 Name **Bon-Point**  
 Site **Sai Ying Pun Station (Vent Shaft Z & Entrance C)**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	3	21	31	36	44	55	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>55 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>60 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>62 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **36**  
 Name **Queen's Hotel**  
 Site **Sai Ying Pun Station (Vent Shaft Y and Entrance A1 & A2)**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	3	21	31	36	44	55	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>55 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>60 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>62 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers, Drill Rig and Pile Rig**

NSR No. **37**  
 Name **College View Mansion**  
 Site **Sai Ying Pun Station (High Street Site)**

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	5.5 6 -1	m m dB	Site measurement of breaker operation at distance = 5.5m Shortest distance from the site to the NSR
3	Soil / Rock Damping	0	-0.1	-0.1	-0.2	-0.5	-1	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	3	21	31	36	44	55	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>55 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>60 dB(A)</b>		

**PME Pile Rig**

Using the calculated hydraulic breaker noise to correct to pipepile noise	6.6 dB(A)	20log(0.638/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for pile rig operation	<b>62 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station UNI  
 NSR No. 31  
 Name The Belcher's (Block 5)  
 Site Adit to Entrance C2

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 45 -18	5.5 45 -18	5.5 45 -18	5.5 45 -18	5.5 45 -18	5.5 45 -18	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-15	4	13	19	27	38	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>39 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>44 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station SYP  
 NSR No. 34  
 Name Kiu Shing Building  
 Site Adit to Entrance B3

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 0 6	5.5 0 6	5.5 0 6	5.5 0 6	5.5 0 6	5.5 0 6	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	-3.19	-6.27	-12.5	-24.9	-40	-40	dB	Vibration will be transmitted from the rock head to the soil and then to the pile of the building (Soil damping distance = 22m)
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	7	22	25	18	11	22	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>29 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>34 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station SYP  
 NSR No. 36A  
 Name 6-28 Eastern Street  
 Site Vent Adit

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-8	11	20	26	34	45	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>46 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>51 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station UNI  
 NSR No. 38  
 Name Bowie Court  
 Site Adit to Entrance A

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 35 -16	5.5 35 -16	5.5 35 -16	5.5 35 -16	5.5 35 -16	5.5 35 -16	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-12	6	16	21	29	40	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>41 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>46 dB(A)</b>		



**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station UNI  
 NSR No. 39  
 Name Intelligent Court  
 Site Adit to Entrance B1

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 10 -5	5.5 10 -5	5.5 10 -5	5.5 10 -5	5.5 10 -5	5.5 10 -5	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-1	17	26	32	40	51	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>52 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>57 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station UNI  
 NSR No. 40  
 Name Sik On Building  
 Site Adit to Entrance B2

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-8	11	20	26	34	45	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>46 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>51 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station UNI  
 NSR No. 41  
 Name Yick Fung Garden  
 Site Construction Adit

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-8	11	20	26	34	45	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>46 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>51 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station UNI  
 NSR No. 42  
 Name Wing Fu Lau  
 Site Vent Adit (YS-Y)

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	5.5 20 -11	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-8	11	20	26	34	45	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>46 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1 dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation	<b>51 dB(A)</b>		

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station SYP  
 NSR No. 43  
 Name **Tat Hing Building**  
 Site Adit to Entrance A1

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 5 1	5.5 5 1	5.5 5 1	5.5 5 1	5.5 5 1	5.5 5 1	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	5	23	32	38	46	57	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>58 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1	dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation				<b>63 dB(A)</b>

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station SYP  
 NSR No. 44  
 Name **Yee Shun Building**  
 Site Adit to Entrance B1/B2

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.12091	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 0 6	5.5 0 6	5.5 0 6	5.5 0 6	5.5 0 6	5.5 0 6	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	-1.31	-2.58	-5.15	-10.2	-20.5	-40	dB	Vibration will be transmitted from the rock head to the soil and then to the pile of the building (Soil damping distance = 7m)
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	8	26	32	33	31	22	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>37 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1	dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation				<b>42 dB(A)</b>

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station SYP  
 NSR No. 45  
 Name Jade Court  
 Site Adit to Entrance C

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 32 -15	5.5 32 -15	5.5 32 -15	5.5 32 -15	5.5 32 -15	5.5 32 -15	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-12	7	16	22	30	41	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>42 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1	dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation				<b>47 dB(A)</b>

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station SYP  
 NSR No. 46  
 Name 21-23 High Street  
 Site Vent Adit

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 25 -13	5.5 25 -13	5.5 25 -13	5.5 25 -13	5.5 25 -13	5.5 25 -13	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-9	9	18	24	32	43	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>44 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1	dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation				<b>49 dB(A)</b>

**Appendix 4.3 Detailed Calculation of Ground-borne Noise Impacts from Hydraulic Breakers and Rock Drill in Adits**

Station SYP  
 NSR No. 47  
 Name Sun Luen Building  
 Site Vent Adit

**PME Excavator Mounted Breaker**

Item	Description	16	31.5	63	125	250	500	Hz	Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
	rms velocity	0.059	0.068	0.062	0.05	0.062	0.121	mm/s	Adopted from KSL EIA Appendix 7-1, Site Vibration Measurement
1	Vibration Velocity, ref 10 <sup>-6</sup> mm/s	95	97	96	94	96	102	dB(V)	
2	Ro R Distance Attenuation	5.5 40 -17	5.5 40 -17	5.5 40 -17	5.5 40 -17	5.5 40 -17	5.5 40 -17	m m dB	Site measurement of breaker operation at distance = 5.5m Distance from the adit to the NSR
3	Soil / Rock Damping	0	0	0	0	0	0	dB	Vibration will be transmitted from the rock breaking to the pile of the building. The whole transmission path is assumed to be rock
4	Building Coupling Loss	-7	-7	-10	-13	-14	-14	dB	Transportation Noise Reference Book, EIA Report Section 4.40
5	Floor to Floor Attenuation	-1	-1	-1	-1	-1	-1	dB	Assume -1 dB per floor, EIA Report Section 4.41
6	Conversion from Vibration to Noise	-27	-27	-27	-27	-27	-27	dB	Adopted from KSL EIA Table 7-4
7	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB(A)	Standard acoustic principal
	Individual Groundborne Noise	-14	5	14	20	28	39	dB(A)	Standard acoustic principal
	Predicted Groundborne Noise for Hydraulic Breaker Operation								<b>40 dB(A)</b>

**PME Drill Rig**

Using the calculated hydraulic breaker noise to correct to Rock Drill Noise	5.1	dB(A)	20log(0.536/0.298)	Site measurement in KSL EIA Appendix 7-1
Predicted Groundborne Noise for drill rig operation				<b>45 dB(A)</b>