Appendix 4.7b Calculation of Construction Ground-borne Noise Levels during Restricted Hours (Unmitigated Scenario)

Ground-borne Noise (GBN) from PME Operation

NSR ID. : PHD
NSR Name : Planned Housing Development (NKIL6579)

Construction of New Middle Third Tunnel

Construction Activity	PME	No. of PME	GBN Level
Construction of New Middle Third Tunnel	TBM	1	42 dB(A)
Overall Predicted Ground-borne Noise Level			**42 dB(A)**
Evening Ground-borne Noise Criteria			**55 dB(A)**
Compliance (Yes/No)			**Yes**
Night-time Ground-borne Noise Criteria			**40 dB(A)**
Compliance (Yes/No)			**No**

Enlargement of Existing Kowloon bound Tunnel

PME: Hydraulic Breaker

Item	Description								Reference and Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
$L_{v,rms}$	Source Vibration Velocity	0.06	0.07	0.06	0.05	0.06	0.12	mm/s	Reference from KSL EIA Appendix 7-1
	Vibration Velocity, ref 10^ -6 mm/s	96	97	96	94	96	102	dB	
C_{dist}	Distance Attenuation: -20*log (R/R_0)	-28.4	-28.4	-28.4	-28.4	-28.4	-28.4	dB	R = 145m; R_0 =5.5m
$C_{damping}$	Soil Damping	0	0	0	0	0	0	dB	Assume no soil damping correction as vibration would transmit through rock layer
$C_{building}$	Coupling Loss into Building Structures	0	0	0	0	0	0	dB	For conservative approach, no correction is assumed
C_{floor}	Floor to Floor Attenuation	0	0	0	0	0	0	dB	1 dB/ floor is assumed
C_{noise}	Conversion from Floor Vibration to Noise Levels	-27	-27	-27	-27	-27	-27	dB	Reference from KSL EIA Report Appendix 7.1
C_{multi}	Noise Level Increase due to Multiple Sources	0	0	0	0	0	0	dB	
C_{cum}	Cumulative Effect due to Neighbouring Sites	0	0	0	0	0	0	dB	No concurrent project identified within 300m from the NSR
Vibration to Noise	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB	Standard acoustical principles
	Ground-borne Noise	-17	2	14	22	32	43	dB(A)	
	Predicted Ground-borne Noise Level for 1 Hydraulic Breaker						43.3	dB(A)	

Construction Activity	PME	No. of PME	GBN Level
Enlargement of Existing Kowloon bound Tunnel	Hydraulic Breaker	4	49 dB(A)
Overall Predicted Ground-borne Noise Level			**49 dB(A)**
Evening Ground-borne Noise Criteria			**55 dB(A)**
Compliance (Yes/No)			**Yes**
Night-time Ground-borne Noise Criteria			**40 dB(A)**
Compliance (Yes/No)			**No**

Rehabilitation of Existing Shatin Bound Tunnel

PME: Hydraulic Breaker

Item	Description								Reference and Assumption
	Octave Band Frequency	16	31.5	63	125	250	500	Hz	
$L_{v,rms}$	Source Vibration Velocity	0.06	0.07	0.06	0.05	0.06	0.12	mm/s	Reference from KSL EIA Appendix 7-1
	Vibration Velocity, ref 10^ -6 mm/s	96	97	96	94	96	102	dB	
C_{dist}	Distance Attenuation: -20*log (R/R_0)	-25.2	-25.2	-25.2	-25.2	-25.2	-25.2	dB	R = 100m; R_0 =5.5m
$C_{damping}$	Soil Damping	0	0	0	0	0	0	dB	Assume no soil damping correction as vibration would transmit through rock layer
$C_{building}$	Coupling Loss into Building Structures	0	0	0	0	0	0	dB	For conservative approach, no correction is assumed
C_{floor}	Floor to Floor Attenuation	0	0	0	0	0	0	dB	1 dB/ floor is assumed
C_{noise}	Conversion from Floor Vibration to Noise Levels	-27	-27	-27	-27	-27	-27	dB	Reference from KSL EIA Report Appendix 7.1
C_{multi}	Noise Level Increase due to Multiple Sources	0	0	0	0	0	0	dB	
C_{cum}	Cumulative Effect due to Neighbouring Sites	0	0	0	0	0	0	dB	No concurrent project identified within 300m from the NSR
Vibration to Noise	Conversion to A-weighted Noise	-56.7	-39.4	-26.2	-16.1	-8.6	-3.2	dB	Standard acoustical principles
	Ground-borne Noise	-13	5	17	26	35	46	dB(A)	
	Predicted Ground-borne Noise Level for 1 Hydraulic Breaker						46.6	dB(A)	

PME: Drill Rig

Using the calculated hydraulic breaker noise to correct to Drill Rig Noise	5.1	dB(A)	20 log(0.536/0.298)
Predicted Ground-borne Noise Level for 1 Drill Rig	52	dB(A)	

Construction Activity	PME	No. of PME	GBN Level
Rehabilitation of Existing Shatin Bound Tunnel	Hydraulic Breaker	1	47 dB(A)
	Drill Rig	1	52 dB(A)
Overall Predicted Ground-borne Noise Level			**53 dB(A)**
Evening Ground-borne Noise Criteria			**55 dB(A)**
Compliance (Yes/No)			**Yes**
Night-time Ground-borne Noise Criteria			**40 dB(A)**
Compliance (Yes/No)			**No**