



**Railway Ground-borne Noise Impact Assessment for Ground Floor of Freespace based on Location 2 Monitoring Data**

**Airport Express Link (AEL)**

Railway Direction	Parameters / Correction Factors	Frequency, Hz															Overall Lmax(A)	
		16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		500
To Airport	Maximum Measured Vibration Level (micro inch/s)	137.7	236.2	511.5	620.9	1115.2	2162.6	687.6	350.6	307.9	486.0	175.8	175.2	135.8	4.8	14.7	9.8	
	Maximum Measured Vibration Level (dB)	42.8	47.5	54.2	55.9	60.9	66.7	56.7	50.9	49.8	53.7	44.9	44.9	42.7	13.6	23.3	19.8	
	Trackform Correction <sup>1</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction <sup>2</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Coupling Loss <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Attenuation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Conversion from Vibration to Noise (CTN)	-54.7	-48.5	-42.7	-37.4	-32.6	-28.2	-24.2	-20.5	-17.1	-14.1	-11.4	-8.9	-6.6	-4.6	-2.8	-1.2	
	Predicted Maximum Noise Level, dB(A)	-5.9	5.0	17.5	24.5	34.3	44.5	38.5	36.4	38.7	45.6	39.5	42.0	42.1	15.0	26.5	24.6	

Railway Direction	Parameters / Correction Factors	Frequency, Hz															Overall Lmax(A)	
		16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		500
To Hong Kong	Maximum Measured Vibration Level (micro inch/s)	132.2	282.3	619.6	689.0	1694.9	2586.0	1681.7	590.1	401.8	346.7	201.8	202.9	202.3	69.5	16.5	9.2	
	Maximum Measured Vibration Level (dB)	42.4	49.0	55.8	56.8	64.6	68.3	64.5	55.4	52.1	50.8	46.1	46.1	46.1	36.8	24.3	19.3	
	Trackform Correction <sup>1</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction <sup>2</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Coupling Loss <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Attenuation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Conversion from Vibration to Noise (CTN)	-54.7	-48.5	-42.7	-37.4	-32.6	-28.2	-24.2	-20.5	-17.1	-14.1	-11.4	-8.9	-6.6	-4.6	-2.8	-1.2	
	Predicted Maximum Noise Level, dB(A)	-6.3	6.5	19.1	25.4	38.0	46.1	46.3	40.9	41.0	42.7	40.7	43.2	45.5	38.2	27.5	24.1	

**Tung Chung Line (TCL)**

Railway Direction	Parameters / Correction Factors	Frequency, Hz															Overall Lmax(A)	
		16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		500
To Tung Chung	Maximum Measured Vibration Level (micro inch/s)	134.1	169.6	592.4	617.6	1116.6	1917.8	769.3	436.5	321.6	379.7	177.3	190.2	142.9	90.0	17.8	9.0	
	Maximum Measured Vibration Level (dB)	42.6	44.6	55.5	55.8	61.0	65.7	57.7	52.8	50.1	51.6	45.0	45.6	43.1	39.1	25.0	19.1	
	Trackform Correction <sup>1</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction <sup>2</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Coupling Loss <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Attenuation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Conversion from Vibration to Noise (CTN)	-54.7	-48.5	-42.7	-37.4	-32.6	-28.2	-24.2	-20.5	-17.1	-14.1	-11.4	-8.9	-6.6	-4.6	-2.8	-1.2	
	Predicted Maximum Noise Level, dB(A)	-6.1	2.1	18.8	24.4	34.4	43.5	39.5	38.3	39.0	43.5	39.6	42.7	42.5	40.5	28.2	23.9	

Railway Direction	Parameters / Correction Factors	Frequency, Hz															Overall Lmax(A)	
		16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		500
To Hong Kong	Maximum Measured Vibration Level (micro inch/s)	167.4	183.3	723.5	740.4	1634.4	1350.5	753.1	499.7	472.2	428.5	242.9	302.4	182.0	125.8	22.0	10.7	
	Maximum Measured Vibration Level (dB)	44.5	45.3	57.2	57.4	64.3	62.6	57.5	54.0	53.5	52.6	47.7	49.6	45.2	42.0	26.8	20.6	
	Trackform Correction <sup>1</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction <sup>2</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Coupling Loss <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Attenuation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Conversion from Vibration to Noise (CTN)	-54.7	-48.5	-42.7	-37.4	-32.6	-28.2	-24.2	-20.5	-17.1	-14.1	-11.4	-8.9	-6.6	-4.6	-2.8	-1.2	
	Predicted Maximum Noise Level, dB(A)	-4.2	2.8	20.5	26.0	37.7	40.4	39.3	39.5	42.4	44.5	42.3	46.7	44.6	43.4	30.0	25.4	

- Note: (1) Trackform correction is based on information provided by MTRC. Same trackforms (LVT Blocks) are at the monitoring location and NSRs.  
 (2) Speed correction is based on information provided by MTRC. Same speeds (100kph) are at both directions of NSR and monitoring location.  
 (3) Same Building Coupling Loss is assumed at the monitoring location and NSR.  
 (4) Train Length of AEL/TCL (184.2m) is based on the latest information provided by MTRCL.

**Predicted Maximum Noise Level of Different Scenarios**

Possible Scenarios for both bounds	Description	Lmax, dB(A)			Predicted Overall Lmax, dB(A)	
1	AEL-Northbound and AEL-Southbound	AEL-NB	51.1	AEL-SB	53.2	55.3
2	AEL-Northbound and TCL-Southbound	AEL-NB	51.1	TCL-SB	52.9	55.1
3	TCL-Northbound and AEL-Southbound	TCL-NB	51.1	AEL-SB	53.2	55.3
4	TCL-Northbound and TCL-Southbound	TCL-NB	51.1	TCL-SB	52.9	55.1

Maximum Predicted Overall, L<sub>Max</sub> (dB(A)) of Freespace: 55.3

Note: Worst case scenario have been shown in above table since no two northbound trains or two southbound trains will simultaneously on same section of the railways due to safety reason.

Average Train Frequency	TCL	AEL		
AM peak: 4 min.	4 min.	10 min.	Daytime peak Leq(30m):	43.0 dB(A)
PM peak: 4 min.	4 min.	10 min.	Evening peak Leq(30m):	43.0 dB(A)
Non-peak: 6 min.	6 min.	10 min.	Night-time Leq(30m):	41.0 dB(A)
Kowloon Station daily operating hours: 19h and 37min			Leq(24 hr):	40.6 dB(A)

(assuming each of the AM peak and PM peak last for 2 hours)

Note: Train frequency is based on the latest information provided by MTRCL.

**Railway Ground-borne Noise Impact Assessment for 1st Floor of M+ and Lyric Theatre based on Location 3 Monitoring Data**

**Airport Express Link (AEL)**

Railway Direction	Parameters / Correction Factors	Frequency, Hz															Overall Lmax(A)	
		16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		500
To Airport	Maximum Measured Vibration Level (micro inch/s)	569.5	655.4	262.1	382.8	300.5	179.9	132.3	43.5	24.8	22.8	18.9	20.9	29.7	12.2	12.6	18.5	38.5
	Maximum Measured Vibration Level (dB)	55.1	56.3	48.4	51.7	49.6	45.1	42.4	32.8	27.9	27.2	25.5	26.4	29.5	21.7	22.0	25.3	
	Trackform Correction <sup>1</sup>	0	-4	-5	-8	-3	3	5	7	5	3	1	8	6	0	0	0	
	Speed Correction <sup>2</sup>	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
	Building Coupling Loss <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Attenuation	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-3	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Conversion from Vibration to Noise (CTN)	-54.7	-48.5	-42.7	-37.4	-32.6	-28.2	-24.2	-20.5	-17.1	-14.1	-11.4	-8.9	-6.6	-4.6	-2.8	-1.2	
	Predicted Maximum Noise Level, dB(A)	6.6	10.0	6.9	12.5	20.2	26.1	29.4	25.5	22.0	22.3	21.3	30.7	34.1	22.3	23.4	28.3	

Railway Direction	Parameters / Correction Factors	Frequency, Hz															Overall Lmax(A)	
		16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		500
To Hong Kong	Maximum Measured Vibration Level (micro inch/s)	240.1	274.1	332.2	361.6	550.9	225.3	85.1	31.9	21.4	33.2	27.1	43.7	41.0	10.1	11.5	16.9	41.2
	Maximum Measured Vibration Level (dB)	47.6	48.8	50.4	51.2	54.8	47.1	38.6	30.1	26.6	30.4	28.6	32.8	32.3	20.1	21.2	24.6	
	Trackform Correction <sup>1</sup>	0	-4	-5	-8	-3	3	5	7	5	3	1	8	6	0	0	0	
	Speed Correction <sup>2</sup>	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
	Building Coupling Loss <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Attenuation	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-3	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Conversion from Vibration to Noise (CTN)	-54.7	-48.5	-42.7	-37.4	-32.6	-28.2	-24.2	-20.5	-17.1	-14.1	-11.4	-8.9	-6.6	-4.6	-2.8	-1.2	
	Predicted Maximum Noise Level, dB(A)	-0.9	2.5	8.9	12.0	25.4	28.1	25.6	22.8	20.7	25.5	24.4	37.1	36.9	20.7	22.6	27.6	

**Tung Chung Line (TCL)**

Railway Direction	Parameters / Correction Factors	Frequency, Hz															Overall Lmax(A)	
		16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		500
To Tung Chung	Maximum Measured Vibration Level (micro inch/s)	207.5	189.1	355.7	425.4	503.2	200.0	106.4	38.5	93.7	125.6	160.8	86.8	359.0	32.2	21.6	15.1	56.2
	Maximum Measured Vibration Level (dB)	46.3	45.5	51.0	52.6	54.0	46.0	40.5	31.7	39.4	42.0	44.1	38.8	51.1	30.2	26.7	23.6	
	Trackform Correction <sup>1</sup>	0	-4	-5	-8	-3	3	5	7	5	3	1	8	6	0	0	0	
	Speed Correction <sup>2</sup>	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
	Building Coupling Loss <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Attenuation	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-3	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Conversion from Vibration to Noise (CTN)	-54.7	-48.5	-42.7	-37.4	-32.6	-28.2	-24.2	-20.5	-17.1	-14.1	-11.4	-8.9	-6.6	-4.6	-2.8	-1.2	
	Predicted Maximum Noise Level, dB(A)	-2.2	-0.8	9.5	13.4	24.6	27.0	27.5	24.4	33.5	37.1	39.9	43.1	55.7	30.8	28.1	26.6	

Railway Direction	Parameters / Correction Factors	Frequency, Hz															Overall Lmax(A)	
		16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400		500
To Hong Kong	Maximum Measured Vibration Level (micro inch/s)	570.5	594.6	228.2	421.3	255.8	176.9	142.9	40.5	38.2	80.6	54.8	26.1	58.5	11.9	23.7	17.1	42.7
	Maximum Measured Vibration Level (dB)	55.1	55.5	47.2	52.5	48.2	45.0	43.1	32.2	31.6	38.1	34.8	28.3	35.3	21.5	27.5	24.7	
	Trackform Correction <sup>1</sup>	0	-4	-5	-8	-3	3	5	7	5	3	1	8	6	0	0	0	
	Speed Correction <sup>2</sup>	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
	Building Coupling Loss <sup>3</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Structure Attenuation	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-2	-2	-2	-3	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Conversion from Vibration to Noise (CTN)	-54.7	-48.5	-42.7	-37.4	-32.6	-28.2	-24.2	-20.5	-17.1	-14.1	-11.4	-8.9	-6.6	-4.6	-2.8	-1.2	
	Predicted Maximum Noise Level, dB(A)	6.6	9.2	5.7	13.3	18.8	26.0	30.1	24.9	25.7	33.2	30.6	32.6	39.9	22.1	28.9	27.7	

- Note: (1) Trackform information is provided by MTRC. LVT Blocks were used at NSR and FST were used at monitoring location 3. Trackform correction is based on approved SIL EIA (AEIAR-155/2010) Appendix 3.13. Different of trackform Type 1A (LVT Blocks) and Type 1B (FST).  
 (2) Speed correction is based on information provided by MTRC. Speeds are 75kph at both directions of NSRs and 65kph at both directions of monitoring location.  
 (3) Same Building Coupling Loss is assumed at the monitoring location and NSRs.  
 (4) Train Length of AEL/TCL (184.2m) is based on the latest information provided by MTRCL.

**Predicted Maximum Noise Level of Different Scenarios**

Possible Scenarios for both bounds	Description	Lmax, dB(A)			Predicted Overall Lmax, dB(A)	
1	AEL-Northbound and AEL-Southbound	AEL-NB	38.5	AEL-SB	41.2	43.1
2	AEL-Northbound and TCL-Southbound	AEL-NB	38.5	TCL-SB	42.7	44.1
3	TCL-Northbound and AEL-Southbound	TCL-NB	56.2	AEL-SB	41.2	56.3
4	TCL-Northbound and AEL-Southbound	TCL-NB	56.2	TCL-SB	42.7	56.4

Maximum Predicted Overall, L<sub>Max</sub> (dB(A)) of M+ / Lyric Centre: 56.4

Note: Worst case scenario have been shown in above table since no two northbound trains or two southbound trains will simultaneously on same section of the railways due to safety reason.

Average Train Frequency	TCL	AEL		
AM peak:	4 min.	10 min.	Daytime peak Leq(30m):	44.1 dB(A)
PM peak:	4 min.	10 min.	Evening peak Leq(30m):	44.1 dB(A)
Non-peak:	6 min.	10 min.	Night-time Leq(30m):	42.1 dB(A)
Kowloon Station daily operating hours:	19h and 37min		Leq(24 hr):	41.7 dB(A) (assuming each of the AM peak and PM peak last for 2 hours)

Note: Train frequency is based on the latest information provided by MTRCL.