Railway Ground-borne Noise Impact Assessment for 1st Floor of Xiqu Centre based on Location 1 Monitoring Data

West Rail - Kowloon Southern Link (WR-KSL)

									Freque	ency, Hz]
Railway Direction	Parameters / Correction Factors	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	
To Hung Hom	Maximum Measured Vibration Level (micro inch/s)	63.9	94.8	59.6	33.8	31.3	83.4	35.9	17.8	14.0	7.4	19.0	15.6	15.3	5.0	7.7	9.2	
	Maximum Measured Vibration Level (dB)	36.1	39.5	35.5	30.6	29.9	38.4	31.1	25.0	22.9	17.4	25.6	23.9	23.7	14.0	17.7	19.3	
	Trackform Correction ¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction ²	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Building Coupling Loss ³	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	-2	-2	-2	-3	-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	Overall
	Predicted Maximum Noise Level, dB(A)	-12.6	-3.0	-1.2	-0.8	3.3	16.2	12.9	10.5	11.8	9.3	20.2	20.0	22.1	14.4	18.9	22.1	2

									Freque	ency, Hz								
Railway Direction	Parameters / Correction Factors	16	20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	
To Tuen Mun	Maximum Measured Vibration Level (micro inch/s)	50.6	57.0	70.2	29.5	30.3	51.6	45.0	32.9	18.6	13.8	8.2	14.6	14.9	5.2	7.4	9.4	
	Maximum Measured Vibration Level (dB)	34.1	35.1	36.9	29.4	29.6	34.3	33.1	30.3	25.4	22.8	18.2	23.3	23.5	14.3	17.4	19.5	
	Trackform Correction ¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction ²	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
	Building Coupling Loss ³	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	-2	-2	-2	-3	-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	Overall L
	Predicted Maximum Noise Level, dB(A)	-14.6	-7.4	0.2	-2.0	3.0	12.1	14.9	15.8	14.3	14.7	12.8	19.4	21.9	14.7	18.6	22.3	28

Note: (1) Trackform correction is based on trackform information from KSL EIA (AEIAR-083/2005). MTRC confrimed the best available information can refer to approved KSL EIA. Same trackform (FST) at the monitoring location and NSRs.

(2) Speed correction is based on speed information from KSL EIA (AEIAR-083/2005). Speeds are 72kph at both directions of NSR and 63&65kph at Hung Hom direction and Tuen Mun direction of monitoring location.

(3) Same Building Coupling Loss is assumed at the monitoring location and NSR.

(4) Train Length of WR-KSL (171.24m) is based on the latest information provided by MTRCL.

Predicted Maximum Noise Level of Different Scenarios

Possible Scenarios	Description		Lmax	dB(A)		Predicted Overall Lmax, dB(A)
1	WR-KSL - Southbound		29	26		28.6
1	WR-KGE - Southbound		20	0.0		20.0
2	WR-KSL - Northbound		- 28	3.3		28.3
3	WR-KSL - Northbound and WR-KSL - Southbound	KSL-SB	28.6	KSL-NB	28.3	31.5
	Maximum Pred	icted Overa	all, L _{Max} (di	B(A)) of Xio	qu Centre:	31.5

Average Train Frequency			
AM peak:	2.5 min.	Daytime peak Leq(30m):	22.6 dB(A)
PM peak:	2.5 min.	Evening peak Leq(30m):	22.6 dB(A)
Non-peak:	5 min.	Night-time Leq(30m):	19.6 dB(A)

Austin Station daily operating hours: 19h and 9min Leq(24 hr): 19.5 dB(A) (assuming each of the AM peak and PM peak last for 2 hours) Note: Train frequency is based on the information of latest Environmental Permit (EP-438/2012/C) in Shatin to Central Link (SCL). Same frequency will be adopted at WR-KSL after the operation of SCL.

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

Airport Express Link (AEL)

									Freque	ency, Hz								
Railway Direction	Parameters / Correction Factors	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 ¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction ²	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Coupling Loss ³	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	Overall Lmax(
	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	51.1

									Freque	ency, Hz								
Railway Direction	Parameters / Correction Factors	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 ¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction ²	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Coupling Loss ³	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	Overall Lmax(
	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	53.2

Tung Chung Line (T	CL)																	
									Freque	ncy, Hz								
Railway Direction	Parameters / Correction Factors	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	1
	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 ¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction ²	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Coupling Loss ³	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	Overall Lma
	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	51.1

									Freque	ency, Hz								
Railway Direction	Parameters / Correction Factors	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 ¹	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Speed Correction ²	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Building Coupling Loss ³	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	Overall Ln
	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	52.9

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 Predi	cted Overa	III, L _{Max} (d	B(A)) of Fr	eespace:	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.	10 min.	Daytime peak Leq(30m):	43.0 dB(A)	
PM peak:	4 min.	10 min.	Evening peak Leq(30m):	43.0 dB(A)	
Non-peak:	6 min.	10 min.	Night-time Leq(30m):	41.0 dB(A)	
Kowloon Station daily operating hours: 1	9h and 3	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)

									Freque	ency, Hz							
Railway Direction	Parameters / Correction Factors	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
	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 ¹	0	-4	-5	-8	-3	3	5	7	5	3	1	8	6	0	0	0
	Speed Correction 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	1.2
	Building Coupling Loss ³	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	-2	-2	-2	-3	-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
1	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

									Freque	ency, Hz								
Railway Direction	Parameters / Correction Factors	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	
	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 ¹	0	-4	-5	-8	-3	3	5	7	5	3	1	8	6	0	0	0	
	Speed Correction 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	1.2	
	Building Coupling Loss ³	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	-2	-2	-2	-3	-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	Overall L
	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	41

Tung Chung Line (TCL)																		
			Frequency, Hz															
Railway Direction	Parameters / Correction Factors	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	1
	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 ¹	0	-4	-5	-8	-3	3	5	7	5	3	1	8	6	0	0	0	
	Speed Correction 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	1.2	
	Building Coupling Loss ³	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	-2	-2	-2	-3	-3	
	Building Structure Resonance	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	1
	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	Overall Lmax
	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	56.2

			Frequency, Hz															
Railway Direction	Parameters / Correction Factors	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	
	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 ¹	0	-4	-5	-8	-3	3	5	7	5	3	1	8	6	0	0	0	
	Speed Correction 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	1.2	
	Building Coupling Loss ³	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	-2	-2	-2	-3	-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	Over
	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 TCL-Southbound	TCL-NB	56.2	TCL-SB	42.7	56.4			
	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	I dB(A)		
PM peak:	4 min.	10 min.	Evening peak Leq(30m): 44.1	I dB(A)		
Non-peak:	6 min.	10 min.	Night-time Leq(30m): 42.1	I dB(A)		
Kowloon Station daily operating hours: Note: Train frequency is based on the latest information provided by MTRCL.		19h and 37	min	Leq(24 hr)	: 41.	7 dB(A)	(assuming each of the AM peak and PM peak last for 2 hours)