

MTR Corporation Limited

HONG KONG SECTION OF GUANGZHOU –
SHENZHEN – HONG KONG EXPRESS RAIL LINK
(No. EP-349/2009/N)

**Noise Review Report for the
Additional Train Operation Scenarios**

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Date : 3 September 2018.

MTR Corporation Limited

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MTR Corporation Limited

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**Environmental Term Consultancy
for Express Rail Link**

**Noise Review Report for the
Additional Train Operation Scenarios**

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1 INTRODUCTION

1.1 Background

- 1.1.1 The “Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link” Project (“XRL”, hereinafter known as “the Project”) comprises a 26km long underground rail line on a dedicated track that runs from the terminus in West Kowloon to the Hong Kong boundary at Huanggang, where it connects with the Mainland section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link. The Project also comprises construction and operation of ventilation buildings, emergency access point, stabling sidings and maintenance facilities and an emergency rescue sidings.
- 1.1.2 An Environmental Impact Assessment (EIA) study for the Project was conducted in accordance with EIA Study Brief No. ESB-197/2008 and was based on the available information obtained during preliminary design stage. The EIA study concluded that the Project would be environmentally acceptable with the implementation of recommended mitigation measures.
- 1.1.3 The EIA Report (Register No.: AEIA-143/2009) was approved on 28 September 2009 under the *Environmental Impact Assessment Ordinance (EIAO)*. Following the approval of the EIA Report, an Environmental Permit (EP) was granted on 16 October 2009 (EP No: EP-349/2009) for the construction and operation of the Project. Variations of environmental permit (VEP) were subsequently applied and the latest Environmental Permit (EP No: EP-349/2009/N) was issued by Director of Environmental Protection (DEP) on 20 August 2018.
- 1.1.4 An Environmental Review Report for the Proposed Design Changes at Shek Kong Stabling Sidings (September 2012) (**SSS ERR**) was attached to the application for VEP-377/2012 for supporting variation of Environmental Permit, which was approved in October 2012. Pursuant to EP Condition 2.26, an Updated Ground-borne Noise Prediction Report (**OGBNPR**) was deposited to DEP in August 2013 based on the train operation details in EP Condition 2.27.
- 1.1.5 Train operation details of the Project have been specified in EP Condition 2.27 and, pursuant to EP Condition 2.27, any change in train operation shall be approved by the DEP subject to the submission of a detailed proposal. Following the recent discussion with relevant operation entities in Mainland, it was advised that there would be additional operation scenarios and therefore a review of noise impact associated with the train operation is required to seek the approval from DEP.
- 1.1.6 MTR Corporation Ltd (MTR), Proponent of the Project, therefore has commissioned AECOM Asia Co. Ltd (AECOM) to conduct a noise review of potential impact associated with the additional train operation scenarios.

1.2 Purpose of This Report

- 1.2.1 This Noise Review Report (**NRR**) has been prepared to assess the likely noise issues pertinent to the additional train operation scenarios and to confirm the compliance with noise standards.

1.3 Report Structure

- 1.3.1 The remainder of the report is organized as follows:
- Section 2 presents the details of the additional operation scenarios and identifies the potential concern associated with additional scenarios.
 - Section 3 presents the conclusions of this Review.

2 ADDITIONAL TRAIN OPERATION SCENARIOS

2.1 Train Operation in EP Condition 2.27

- 2.1.1 Pursuant to EP Condition 2.27, the train operation shall be confined within 0000 to 0015 hours and 0415 to 2400 hours with details presented in **Table 2.1** below.

Table 2.1 Train Operation Details in EP Condition 2.27

Train Operation Details	EP Condition 2.27
Train Length	- Long haul train: not more than 427m long - Short haul train: not more than 241m long
Daily Operation	Not more than a total of 280 short haul trains and 66 long haul trains
Operation Period from 0700 to 2300 hours	Hourly frequency: not more than 13 short haul and 4 long haul trains at northbound and not more than 12 short haul and 3 long haul trains at southbound
Operation Periods of 0000 to 0015 hours, 0415 to 0700 hours and 2300 to 2400 hours	Hourly frequency of 0600 to 0700 hours and 2300 to 2400 hours: not more than 6 short haul trains at northbound and 6 short haul trains at southbound; no long haul train movements in these periods. Frequency of 0000 to 0015 hours: not more than 1 short haul train at northbound. Frequency of 0415 to 0500 hours: not more than 1 short haul train at northbound and 1 short haul train at southbound. Frequency of 0500 to 0600 hours: not more than 1 short haul train at northbound and 2 short haul trains at southbound.
Train Speed	Not faster than 200 km/hr

- 2.1.2 Based on the train operation details in EP Condition 2.27, the maximum train frequency per 30 minutes is presented in **Table 2.2**. Based on the assessment findings in **SSS ERR** and **OGBNPR**, the railway noise induced by the train operation as detailed in **Table 2.1** above comply with the stipulated noise limits.

Table 2.2 Maximum Train Frequency per 30 Minutes in EP Condition 2.27

Time Period	Direction	Train Type	
		Short Haul Train	Long Haul Train
Day & Evening time	Northbound	7	2
	Southbound	6	2
Night-time	Northbound	3	0
	Southbound	3	0

2.2 Additional Operation Scenarios

- 2.2.1 As discussed in **Section 1.1.5**, there would be additional operation scenarios available for the Project. There is also an insignificant change to the length of long trains from not more than 427m to not more than 430m.

- 2.2.2 The maximum train movements during daytime and evening (0700 – 2300 hours) and night-time (2300 – 0100 and 0400 – 0700 hours) in the additional operation scenarios have been identified according to latest timetable of XRL and are presented in **Table 2.3**.

Table 2.3 Train Operation Details in Additional Operation Scenarios

Train Operation Details	Additional Operation Scenarios
Train Length	- Long train: not more than 430m long - Short train: not more than 241m long
Daily Operation	Not more than a total of 190 short trains and 156 long trains
Operation Period from 0700 to 2300 hours	Hourly frequency: not more than 9 short and 6 long trains at northbound and not more than 6 short and 6 long trains at southbound
Operation Periods of 0400 to 0700 hours and 2300 to 0100 hours ⁽¹⁾	Hourly frequency: not more than 2 short and 2 long trains at northbound and not more than 2 short and 2 long trains at southbound
Train Speed	Not faster than 200 km/hr

Note:

- (1) Since the XRL Hong Kong Section is connected to the Mainland High Speed Rail Network, the XRL train operation in Hong Kong will be subject to the train operation in the Mainland. In the event of special incident or urgent train services arrangement in the Mainland, the XRL train services in Hong Kong would be advanced, delayed or changed beyond the schedule. Therefore the train services may be operated beyond the operation hours mentioned in **Table 2.3**, but the train frequency will not exceed the maximum 30min frequency and the hourly frequency mentioned in **Table 2.4**.

- 2.2.3 Based on the proposed train operation details in **Table 2.3** and the latest timetable of XRL, the maximum train frequency per 30 minutes has been developed and is presented in **Table 2.4**.

Table 2.4 Train Frequency – Hourly and Per 30 Minutes

				No. of Train Frequency ⁽¹⁾			
				Hourly Window			
Time Period	Direction	Hourly Frequency		Maximum no. in 30 mins		Other 30 mins	
		Short Train	Long Train	Short Train	Long Train	Short Train	Long Train
Day & Evening time	Northbound	9	6	5	3	4	3
	Southbound	6	6	3	3	3	3
Scenario 1A							
Night-time	Northbound	2	2	2	1	0	1
	Southbound	2	2	2	1	0	1
Scenario 1B							
Night-time	Northbound	2	1	1	0	1	1
	Southbound	2	2	1	2	1	0

Note:

- (1) Since the XRL Hong Kong Section is connected to the Mainland High Speed Rail Network, the XRL train operation in Hong Kong will be subject to the train operation in the Mainland. In the event of special incident or urgent train services arrangement in the Mainland, the XRL train services in Hong Kong would be advanced, delayed or changed beyond the schedule. Therefore the train services may be operated beyond the operation hours mentioned in **Table 2.3**, but the train frequency will not exceed the maximum 30min frequency and the hourly frequency mentioned in **Table 2.4**.

2.3 Review of Representative Noise Sensitive Receivers

- 2.3.1 Representative noise sensitive receivers were identified in **OGBNPR** and **SSS ERR**. A review of representative GBNSRs and ABNSRs has been conducted and it is revealed that there are

no additional representative NSRs for both ground-borne and airborne noise impact assessments.

2.4 Review of Noise Mitigation Measures

- 2.4.1 There is no change to the noise mitigation measures recommended in **OGBNPR** and **SSS ERR**, which have already been implemented by MTR.

2.5 Review of Associated Impacts Due to Additional Operation Scenarios

- 2.5.1 It is expected that the potential impact arising from the proposed additional operation scenarios would be related to operational ground-borne and airborne noise only. Apart from the change of the no. of trains and train frequencies, there is no major change to other parameters that would affect the operational noise impacts.
- 2.5.2 It should be noted that the noise performance of long train and short train would be similar and the major difference would be the correction factor accounting for the train length. It is therefore expected that the noise contribution from 2 short trains would be approximately equivalent to 1 long train, or vice versa. The proposed minor changes of train operation details as discussed in **Section 2.2.1** and **Table 2.3 / Table 2.4** would induce approximate additional noise level of about 1.2dB(A) during night-time period and there would be no change in the predicted day & evening time noise levels (**Annex 2.1** refers). In addition that there is no change in train source term, it is anticipated that there would be no change in L_{max} (2300 - 0700 hours) due to additional operation scenarios.
- 2.5.3 According to Table 2.9 of OGBNPR, the mitigated ground-borne noise levels (L_{eq, 30min}) during day & evening time and night-time periods are up to 29dB(A) and 24dB(A) respectively, which are at least 20dB(A) lower than the respective stipulated noise criterion. It is therefore anticipated that the overall ground-borne noise impact during day & evening time and night-time periods would still well within respective statutory noise criterion.
- 2.5.4 For airborne railway noise, the no. of trains and other parameters that would affect the operational airborne noise impact launching from and arriving at the SSS remain the same as that discussed in the **SSS ERR**. The only minor change is the train length of long train (i.e. from 427m to 430m). Such minor change does not affect the train source term running at 25km/h as adopted in **SSS ERR**. According to the **SSS ERR**, the maximum cumulative airborne railway noise levels (L_{eq, 30min}) from maximum train movements including (i) trains launching from and arriving at SSS and (ii) trains passing through ERS during day & evening time and night-time periods are 57dB(A) and 52dB(A) respectively. With addition of approximate 1.2dB(A) during night-time period only, the overall airborne noise levels (L_{eq, 30min}) during both day & evening time and night-time periods would still comply with respective statutory noise criterion.
- 2.5.5 For cumulative noise impact from airborne railway noise and fixed plant noise during night-time period, the worst case scenario of fixed plant noise happens within the period from 0100 hours to 0400 hours. Same as the scenario assessed in the **SSS ERR**, when the worst case scenario of fixed plant noise happens during this period there would be no train launching from and arriving at SSS and passing through ERS. The cumulative noise levels from airborne railway noise and fixed plant noise within the same worst case scenario of fixed plant noise as presented in **SSS ERR** thus remain unchanged. Since the maximum fixed plant noise level during the worst case scenario is only 44dB(A), which is more than 10dB(A) below the acceptable noise level (ANL), the fixed plant noise levels during other periods will be even lower. The cumulative noise impacts during other periods will be dominated by the airborne railway noise with approximate 1.2dB(A) increase under the additional operation scenarios and will still comply with the statutory noise criteria.
- 2.5.6 It is therefore considered that the additional operation scenarios would not result in adverse ground-borne and airborne noise impacts.

3 CONCLUSION

- 3.1.1 Based on the latest information on train operation scenarios, the potential operational airborne and ground-borne noise impact has been reviewed. It is noted that the noise performance of long train and short train would be similar and the major difference would be the correction factor accounting for the train length. The noise contribution from 2 short trains would be approximately equivalent to 1 long train, or vice versa. Any change of 2 short trains to 1 long train in frequency or vice versa will not induce additional impact.
- 3.1.2 It is expected that the proposed additional operation scenarios would only induce additional noise level of about 1.2dB(A) during night-time period and there would be no change in the predicted day & evening time noise levels, and thus the overall change of noise impacts would be insignificant. Both the ground-borne and airborne noise levels under additional operation scenarios are still well within the stipulated noise criteria.
- 3.1.3 It is therefore concluded that there would be no adverse noise impacts due to additional operation scenarios as discussed in **Section 2.2**.

Annex 2.1

Calculation of Differences in Railway Noise Levels

Calculation of Differences in Railway Noise Levels

EP Condition 2.27 - Max. 30min Train Frequency

Time Period	Direction	Train Type	
		Short Train	Long Train
Daytime	Northbound	7	2
	Southbound	6	2
Night-time	Northbound	3	0
	Southbound	3	0

Additional Operation Scenario 1 - Max. 30min Train Frequency

Time Period	Direction	Train Type	
		Short Train	Long Train
Daytime	Northbound	5	3
	Southbound	3	3

Additional Operation Scenario 1A

Time Period	Direction	Train Type	
		Short Train	Long Train
Night-time	Northbound	2	1
	Southbound	2	1

Additional Operation Scenario 1B

Time Period	Direction	Train Type	
		Short Train	Long Train
Night-time	Northbound	1	0
	Southbound	1	2

Total Short Train Length	Total Long Train Length	Total Train Length
3133	1708	4841
1446	0	1446

Approximately equivalent to total no. of short train
20
6

Total Short Train Length	Total Long Train Length	Total Train Length
1928	2580	4508

Approximately equivalent to total no. of short train
19

Approx. Change in Noise Level, dB(A)
-0.2

Total Short Train Length	Total Long Train Length	Total Train Length
964	860	1824

Approximately equivalent to total no. of short train
8

Approx. Change in Noise Level, dB(A)
1.2

Total Short Train Length	Total Long Train Length	Total Train Length
482	860	1342

Approximately equivalent to total no. of short train
6

Approx. Change in Noise Level, dB(A)
0.0