

MTR Corporation Limited

ROAD WORKS at WEST KOWLOON

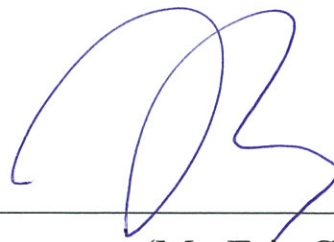
(No. EP-366/2009/A)

Environmental Monitoring and Audit Report No. 92

(February 2019)

Verified by

:



(Mr. Eric CHING)

Position

:

Independent Environmental Checker

Date

:

8 Mar. 2019


MTR Corporation Limited

ROAD WORKS at WEST KOWLOON

(No. EP-366/2009/A)

Environmental Monitoring and Audit Report No. 92

(February 2019)

Certified by : 

(Mr. Raymond WONG)

Position : Environmental Team Leader

Date : 8 March 2019



ROADWORKS AT WEST KOWLOON



Environmental Monitoring and Audit Report No. 92
February 2019

EXECUTIVE SUMMARY

This is the 92nd monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works undertaken during the period from 1 to 28 February 2019 for the Road Works at West Kowloon (hereinafter referred to “the Roadworks” or “the Project”) in accordance with the EM&A Manual and the requirement under EP-366/2009/A.

Air Quality

Air quality monitoring was conducted for 24-hour Total Suspended Particulates (TSP) at three (3) air quality monitoring locations in the vicinity of Works Area in West Kowloon in the reporting month.

Please refer to the section “Environmental Complaints / Exceedance / Non-compliance / Summons and Prosecution” below for the exceedances in air quality in the reporting month.

Air-borne Noise

Air-borne noise was measured in terms of $L_{eq(30min)}$ dB(A) with L_{10} and L_{90} measurements as reference at three (3) noise monitoring locations in the vicinity of Works Area in West Kowloon currently in the interval of once every week since one of the noise monitoring locations has been temporarily suspended since objection has been received from the OC of Sorrento.

Please refer to the section “Environmental Complaints / Exceedance / Non-compliance / Summons and Prosecution” below for the air-borne noise exceedances in the reporting month.

Environmental Audits

In this reporting month, regular site inspections attended by representative from MTRCL and Contractors were carried out at 810A and 811B at West Kowloon. In addition to the regular site inspections, IEC environmental audits attended by IEC, MTRCL and Contractors were held on monthly basis. Issues observed during these inspections and audits were detailed in Section 6.

Environmental Complaints / Exceedance / Non-compliance / Summons and Prosecution

For the reporting month, no environmental complaint related to the Roadworks was referred from EPD. Complaint investigation would be conducted in accordance with the complaint handling procedure in the EM&A Manual when complaint has been received.

No exceedance of both air-borne noise Action and Limits Levels was recorded in the reporting month.

No exceedance of both 24-hour TSP Action and Limit Levels was recorded in the reporting month.

No environmental incident/event related to Roadworks was recorded during the reporting period. Besides, in the reporting period, no summons, no non-compliances and no prosecutions was received related to the Roadworks by MTRCL and/or the Contractors of 810A and 811B.

Works for Coming Month

The construction works were continued in the reporting month of February 2019 and the major works for the following month were summarized in Table 8-1. Impact monitoring has been continued in the reporting month with reference to the EM&A Manual.

Further Environmental Key Issues

Air quality impact and air-borne noise at the affected sensitive receivers shall continue in the following month. Considering the nature of construction activities, key environmental issues in the coming months include the followings:

- Disposal of C&D waste;
- Dust generation from site activities;
- Noise impact from operating equipment; and
- Site water discharge.

Reporting Changes

In the reporting period, there were no reporting changes.

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1. INTRODUCTION

1.1 Project Background

In April 2008, the Government of Hong Kong Special Administrative Region (HKSAR) requested MTR Corporation Limited (MTRCL) to proceed with further planning and design of the Hong Kong section of the Guangzhou-Shenzhen-Hong Kong Express Rail Link, which runs from the West Kowloon Terminus (WKT) to the boundary at Huanggang.

Upon the opening of the WKT of Express Rail Link (XRL) and the development of the West Kowloon Cultural District (WKCD), additional road traffic capacity and network restructuring would be required through and within the West Kowloon Reclamation Area (WKRA). Roads namely D1A, D1, Lin Cheung Road – Austin Road West Underpass and upgrading of Austin Road West would be used to accommodate the anticipated increase in road traffic.

1.2 Coverage

This is the 92nd monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works undertaken during the period from 1 to 28 February 2019 for the Road Works in accordance with the EM&A Manual and the requirement under Environmental Permit No. EP-366/2009/A which was issued on 18 June 2012.

2. PROJECT INFORMATION

2.1 *Project Management Organisation and Management Structure*

The project management organisation chart and contact of key personnel are shown in Appendix B.

2.2 *Construction Activities*

This report marked the 92nd month of civil construction in Works Area in West Kowloon for February 2019. It is noted that the major civil construction has been completed in the third quarter of year 2018; however the outstanding works will continue and anticipate to be completed in the second quarter of year 2019 tentatively. The updated construction activity is provided in Section 8. Major construction activities undertaken in the reporting month is summarized in the following table.

Contract	Major Construction Activities
810A	Existing utilities diversions and new utilities installation by Utility undertakers
811B	Lin Cheung Road (LCR) S/B & N/B road paving & marking, drawpits/ducts for utilities and street lighting; LCR water mains works (remaining), LCR drainage works (rectification works)

Table 2-1 Major construction activities in the reporting month (February 2019)

3. ENVIRONMENTAL STATUS

3.1 *Status of Implementation of mitigation measures*

Environmental mitigation measures recommended in the EIA report for both Construction and Operational Stages are implemented and their status is summarized in Appendices C1 and C2 respectively.

3.2 *Status of Submissions under EP*

A summary of the submissions submitted under the EP for this Project as at 28 February 2019 is presented in Table 3-1 below:

EP-366/2009/A Clause No.	Document Title	Status
3.4	Monthly Environmental Monitoring and Audit Report (January 2019)	Submitted on 14 February 2019

Table 3-1 Summary of the status of submissions submitted under the EP in the reporting month

3.3 *Status of Permit/License/Notifications*

A summary of the status of permits, licences and notifications on the environmental protection made, applied or approved under this Project during the previous and reporting month is presented in Table 3-2 below. The Environmental Permit No. EP-366/2009/A issued by EPD was used for the Roadworks under the XRL project.

Item	Item Description	Application Date	Permit Status
<i>Contract 810A</i>			
1.	Construction Noise Permit (sewage pump outside The Elements)	4 Jan 2019	Granted on 18 Jan 2019 Permit No. GW-RE0045-19, valid from 21 Jan 2019 to 31 Mar 2019
2.	Construction Noise Permit (area in B1 level, Hong Kong West Kowloon Station)	15 Jan 2019	Granted on 29 Jan 2019 Permit No. GW-RE0046-19, valid from 01 Feb 2019 to 31 Mar 2019
<i>Contract 811B</i>			
1.	Construction Noise Permit (general, mainly rectification works for liability period)	24 Aug 2018	Granted on 5 Sep 2018 Permit No. GW-RE0627-18, valid from 7 Sep 2018 to 6 Mar 2019

Table 3-2 Summary of the status of permits, licences and notifications made, applied and approved under this Project during the reporting month

4. SUMMARY OF EM&A REQUIREMENT

4.1 Air Quality

4.1.1 Air Quality Parameters

In accordance to the EM&A Manual, 24-hour Total Suspended Particulates (TSP) levels were measured at three (3) air monitoring locations in accordance with the EM&A Manual. Monitoring was undertaken at each monitoring location once per every 6 days. Information such as date of monitoring, duration, weather condition, equipment used and monitoring results shall be recorded on the field data sheet developed for the Project. Monitoring results are summarized in Section 5.

4.1.2 Monitoring Methodology and Calibration

Monitoring was undertaken to establish for 24-hour Total Suspended Particulates (TSP) at three (3) monitoring locations in the vicinity of the Works Area in West Kowloon. Monitoring of 24-hour TSP was carried out using a high volume sampler (HVS) according to Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA.

The sampling procedure follows to that described Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA. TSP is sampled by drawing air through a conditioned, pre-weighed filter paper inside the high volume sampler at a controlled rate. After 24-hour sampling the filter paper with retained particles shall be collected and returned to HOKLAS accredited laboratory (ALS Technichem (HK) Pty Ltd) for drying in a desiccators followed by accurate weighing. TSP levels are calculated from the ratio of the mass of particulate retained on the filter paper to the total volume of air sampled.

The flow rate of the high volume sampler with mass flow controller was calibrated using an orifice calibrator. Initial calibration (five points) was conducted upon installation and prior to commissioning. Calibration was carried out every six months. The details of calibration are shown in Table 4-1. The samplers shall be properly maintained. Prior to dust monitoring commencing, appropriate checks shall be made to ensure that all equipment and necessary power supply are in good working condition.

Monitoring Station ID	Air Quality Monitoring Station	HVS Serial Number	Last Calibration Date ^[1]
<i>High Volume Sampler</i>			
CAM-1	Podium between Sorrento and The Waterfront	515	9 Nov 2018
CAM-2	Podium next to Tower 3, The Waterfront	1282	9 Nov 2018
CAM-3	Roof of Lift Building, The Victoria Towers	528	9 Nov 2018
<i>Orifice Calibrator</i>			
Serial Number		Last Calibration Date ^[1]	
2421		24 January 2018	

Notes: ^[1] Next calibration date to be confirmed.

Table 4-1 Calibration details of HVS and Orifice Calibrator

4.1.3 Monitoring Location

According to the EM&A Manual, air quality monitoring was carried out at the locations as shown in Table 4-1 above. The monitoring locations are illustrated in Appendix D.

4.1.4 Action and Limit Levels

With reference to the baseline monitoring results, the Action and Limit Levels for the 24-hour TSP monitoring derived are shown in Table 4-2. For reference purpose, the Action and Limit Levels for 1-hr TSP monitoring are included, too.

Monitoring Station ID	1-hour TSP Level in $\mu\text{g}/\text{m}^3$		24-hour TSP Level in $\mu\text{g}/\text{m}^3$	
	Action Level	Limit Level	Action Level	Limit Level
CAM-1	298.4	500	168.8	260
CAM-2	295.6	500	155.9	260
CAM-3	319.4	500	179.3	260

Table 4-2 Action and Limit Levels for Air Quality

4.2 Air-borne Noise

4.2.1 Noise Parameters

In accordance to the EM&A Manual, construction air-borne noise monitoring shall be conducted to obtain one set of 30-minute measurement at each monitoring station between 0700 and 1900 hours on normal weekdays at a frequency of once per week when construction activities are underway. The L_{eq} , L_{10} and L_{90} were also recorded at the specified interval.

4.2.2 Monitoring Methodology and Calibration

As referred to the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Sound Level Meters Model B&K 2250, which complies with the above-mentioned specifications, were used for construction noise monitoring.

Before and after each series of measurements, the accuracy of the sound level meter should be checked by using an acoustic calibrator generating a known sound pressure level at a known frequency. If the difference between the calibration levels obtained before and after each series of noise measurements is less than 1.0 dB, then the measurements could be considered as valid.

The sound level meters and calibrator are verified by the certified laboratory or manufacturer at a regular interval to ensure they perform to the same level of accuracy as stated in the manufacturer's specifications. Details of the calibration record are shown in Table 4-3 and Appendix H.

Monitoring Station ID	Noise Monitoring Location	Serial Number	Last Calibration Date ^[1]
<i>Sound Level Meters</i>			
CNM-1	Man Cheong Street Refuse Station	2718888	30 September 2017
CNM-2 ^[2]	Tower 6, Sorrento	N/A	N/A
CNM-3	Podium next to Tower 3, The Waterfront	2718891	9 September 2017
CNM-4	Tower 2, The Harbour Side	2718886	12 June 2017

Monitoring Station ID	Noise Monitoring Location	Serial Number	Last Calibration Date ^[1]
<i>Calibrator</i>			
Serial Number		Last Calibration Date	
3014997		22 March 2017	

Notes: [1] Next calibration date to be confirmed.

[2] Due to the objection from the OC of Sorrento was received on 6-Aug-2014, monitoring at Tower 6, Sorrento (CNM-2) has been temporarily suspended. Monitoring would be resumed subject to an alternative location could be determined in the vicinity with consent.

Table 4-3 Calibration details of noise monitoring equipment

4.2.3 Monitoring Location

According to the EM&A Manual, air-borne noise monitoring was carried out at the locations as shown in Table 4-3 above. The monitoring locations are illustrated in Appendix D.

4.2.4 Action and Limit Levels

The Action and Limit Levels for the construction air-borne noise are shown in Table 4-4 below.

Time Period	Action	Limit
0700-1900 hours on normal weekdays	When one documented complaint is received	75 dB(A) for residential premises
		70 dB(A) for school and 65 dB(A) during examination period

Table 4-4 Action and Limit Levels for Air-borne Construction Noise

5. MONITORING RESULTS

5.1 Air Quality

The monitoring schedule is shown in Appendix E. Results of 24-hour TSP level and the graphical presentation of monitoring results are shown in Appendix F. The weather condition during the monitoring period is summarized in Appendix G.

In the reporting month, no exceedance was recorded at both 24-hour TSP Action and Limit Levels. Actions stipulated under the Event and Action Plan (Table 3.3 of the EM&A Manual) would be undertaken and the monitoring frequency would be increased if exceedance is recorded.

5.2 Noise

The monitoring schedule is shown in Appendix E. Results of measured air-borne noise level, in terms of $L_{eq(30min)}$ and graphical presentations are presented in Appendix F. The weather condition during the monitoring period is summarized in Appendix G.

In the reporting month, no exceedance was recorded at both air-borne noise Action and Limit Levels. Actions stipulated under the Event and Action Plan (Table 2.3 of the EM&A Manual) would be undertaken if exceedance is recorded.

5.3 Waste Management

The quantities of waste disposed from the Project in the reporting month with the previous 2 months were summarized in the following table:

Reporting Month	Inert C&D ^[1] Materials (tonnes)	Non-inert C&D ^[2] Materials (tonnes)	Chemical Waste	
			(litre)	(kg)
Contract 810A				
December 2018	0	196.8	0	0
January 2019	16.7	109.5	0	0
February 2019	6.6	80.5	0	0
Contract 811B				

Reporting Month	Inert C&D ^[1] Materials (tonnes)	Non-inert C&D ^[2] Materials (tonnes)	Chemical Waste	
			(litre)	(kg)
December 2018	201.2	21.8	0	0
January 2019	236.5	20.2	0	0
February 2019	250.7	14.9	0	0

Table 5-1 Summary of construction waste generated and disposed

Note:

- [1]. Inert C&D materials include bricks, concrete, building debris, rubble and excavated soil.
 [2]. Non-inert C&D materials include steel, paper / cardboard packaging waste, plastics and other wastes such as general refuse.

The cumulative quantities are summarized as follows.

Inert C&D Materials (tonnes)	Non-inert C&D Materials (tonnes)	Chemical Waste	
		(Litre)	(Kg)
74,184.3	10,532.7	3,075	315

6. SITE INSPECTION

Regular site inspections on all environmental aspects under the EM&A Manual were attended by representatives from ET and Contractors. The site inspections were carried out at 810A and 811B in West Kowloon and dates are shown in the following table. In addition to the regular site inspections attended by ET and Contractors, monthly IEC environmental audits attended by IEC, ET and Contractors were held on 20 February 2019 in 810A and 20 February 2019 in 811B.

Contract	Date of Site Inspections
810A	20/2 and 27/2
811B	20/2 and 27/2

Table 6-1 Date of site inspections in the reporting month

All observations have been recorded in the audit checklist and passed to the Contractor together with the appropriate recommended mitigation measures where necessary. The key observations from these site inspections and Contractor's follow-up action are summarized in Table 6-2 below. No non-compliance was observed.

Item	Description	Contractor's Follow-up Action(s) Undertaken
Contract 810A		
1	No specific observation has been made in the inspections	Nil
Contract 811B		
1	No specific observation has been made in the inspections	Nil

Table 6-2 Summary of site inspections, recommendations and follow-up actions

7. NON-COMPLIANCE AND DEFICIENCY

7.1 *Summary of Complaint*

For this reporting month, there was no environmental complaint referred from EPD. There were a total of forty three (43) environmental complaints counted since the commencement of the construction. The complaint would be handled in accordance to the EM&A Manual and relevant parties including Contractors, the Engineer's Representative and IEC when complaint has been received.

Apart from the above, as the Environmental Team (ET) of the Project, we will ensure compliance of the requirements stated in the EM&A Manual and closely liaise with the stakeholders to address any environmental concerns.

7.2 *Summary of Exceedance*

In the reporting month, no exceedance of both air-borne noise Action and Limit Levels was recorded; and no exceedance of both 24-hr TSP Action and Limit Levels was recorded. Actions stipulated under the Event and Action Plan (Tables 2.3 and 3.3 of the EM&A Manual) would be undertaken when exceedance is recorded respectively.

7.3 *Summary of Notification of Summons, Prosecutions, Non-compliance and Corrective Actions*

No notification of environmental warnings from EPD, no summons and no prosecutions was received related to the Roadworks by MTRCL and the Contractors of 810A and 811B in the reporting period.

8. FUTURE KEY ISSUES

8.1 Construction Works in Coming Months

Works to be undertaken for the following month are summarized below. The works presented below are tentative and subject to change in actual construction programme.

Contract	Major Construction Activities
810A	Existing utilities diversions and new utilities installation by Utility undertakers
811B	Lin Cheung Road (LCR) S/B & N/B road paving & marking, drawpits/ducts for utilities and street lighting; LCR water mains works (remaining), LCR drainage works (rectification works)

Table 8-1 Summary of construction works in the coming month (March 2019)

According to the latest programme, civil construction would be continued in the coming month. Impact monitoring would be continued according to the construction programme.

8.2 Road Opening Programme

Regarding to the road opening schedule, the status of road works at West Kowloon (mainly the underpass of Austin Road West / Lin Cheung Road) has been summarized below:

On 17 September 2017, the first phase has been opened for public use. It includes: first level of the Austin Road West underpass, a temporary roundabout for Austin Road West first level driving vehicle near Kowloon MTR Station, and a round road to the properties / shopping mall parking lot of MTR Kowloon Station.

On 17 December 2017, the second phase has been in place for public use. It includes: the lowest level of Lin Cheung Road underpass, partial section of Jordan Road (first level of Lin Cheung Road south underpass), and round road at the east of Austin Road underpass.

On 6 May 2018, the third phase has been in place for public use. It includes: the at-grade level and underpass section of Lin Cheung Road and Jordan Road and Austin Road West.

On 16 June 2018, two lanes of Road D1A(S) and one lane of Wui Man Road have been in place for public use.

The remaining realignment of temporary road D1A(S) and Wui Man Road which adjacent to the taxi lay-by area of West Kowloon Station (WEK) have been in place for public use at the time of WEK opening, i.e. 23 September 2018.

A portion of at grade road of Austin Road West which adjacent Xiqu Centre has been in place on 20 January 2019, in connection to the opening of the Centre.

8.3 *Monitoring Schedule for Next Month*

The tentative schedule of TSP and air-borne noise monitoring for the next reporting period is presented in Appendix E.

9. CONCLUSIONS

The Report presents the results of EM&A works and the impact monitoring for the construction works of the Roadworks under the XRL project undertaken during the period of 1 to 28 February 2019. The major construction activities in the reporting period included pipe installation for drainage utilities work, noise barrier construction and road finishing works in the West Kowloon Works Areas for the Roadworks.

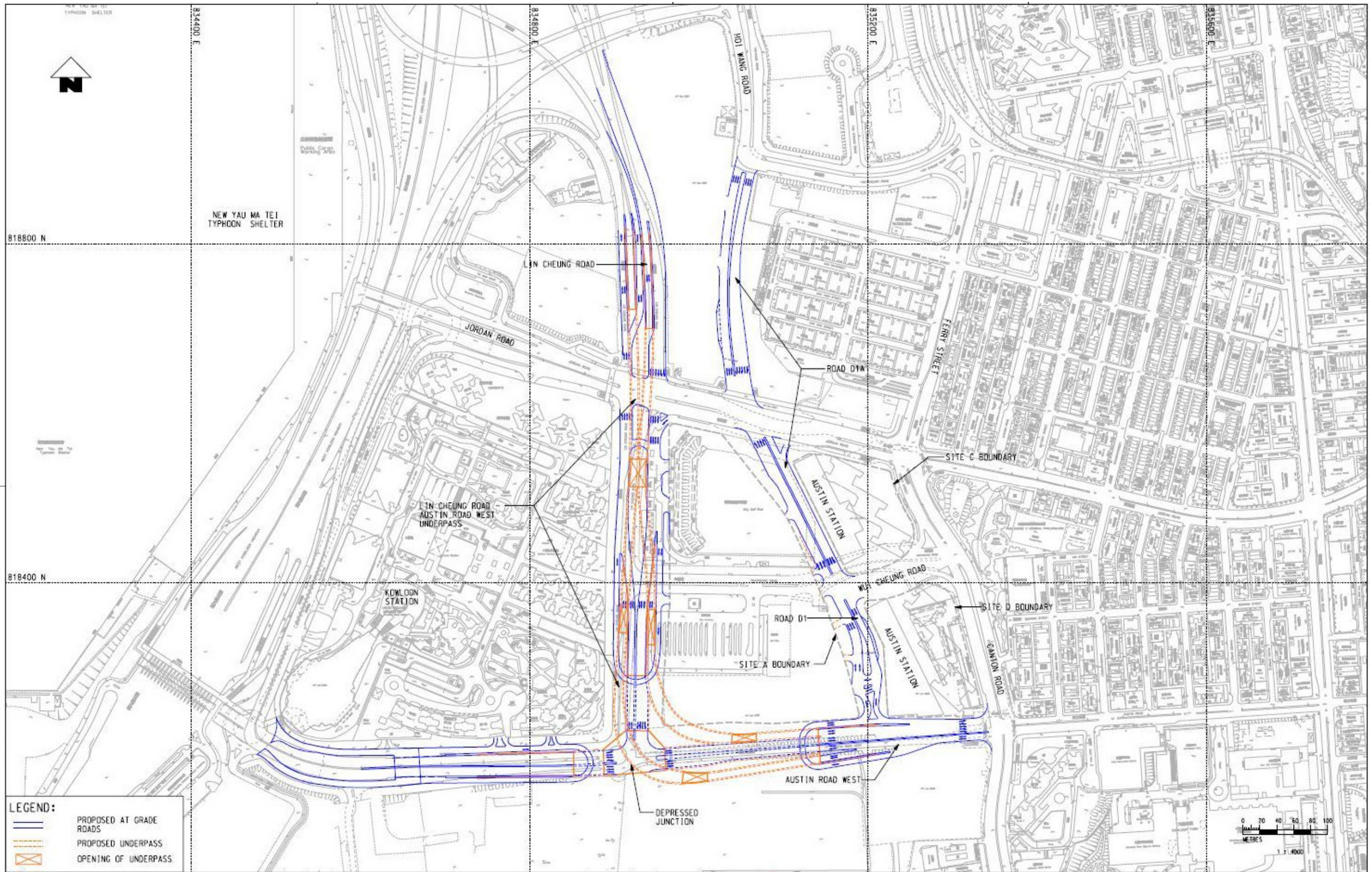
Impact monitoring for air quality and air-borne noise were conducted in accordance with the EM&A Manual in the reporting period. No exceedance of both air-borne noise Action and Limit Levels in the reporting month. Also, no exceedance of both 24-hour TSP Action and Limit Levels was recorded in the reporting month, too.

For the reporting month, no environmental complaint related to the Roadworks was referred from EPD. The complaint has been handled in accordance with the procedures stipulated in the EM&A Manual with investigations at the time of received. Apart from that, no warnings/non-compliances, no summons and no prosecutions were received for Roadworks in the reporting month.

Site inspections were conducted regularly to monitor proper implementation of environmental pollution control and mitigation measures for the Project. The ET would continue the implementation of the environmental monitoring and audit programme in accordance to the EM&A Manual and to a level consistent with MTRCL's Corporate Sustainability Policy.

Appendix A

Works Area



				DRAWN: YJP DESIGNED: TWF CHECKED: KCC APPROVED: PL DATE: 11/MAR./2009				TITLE: ROAD WORKS AT WEST KOWLOON	
				ORIGINATOR: PROJECT DIVISION		TITLE: PROPOSED ROAD WORKS AT WEST KOWLOON			
				CADD REF: NOL_ERL_300_C_WKT_ENS_M62_001A.dgn		SCALE: 1 : 4000 (A3)		FIGURE NO.: NOL/ERL/300/C/WKT/ENS/M62/001	
REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED

WORKS AREA for ROAD WORKS

Appendix B

Project Management Organization and Contacts of Key Personnel

Title	Name	Telephone
Engineer's Representative		
Construction Manager (Contracts 810A & 811B)	Mr. Edmond SO	2926 9062
Independent Environmental Checker		
Independent Environmental Checker	Mr. Eric CHING	2828 5825
Environmental Team		
Environmental Team Leader	Mr. Raymond WONG	2688 1094
Contractors		
<i>Contract 810A</i>		
Principle Project Director	Mr. Adrian CLAMP	3759 9810
Senior Environmental Officer	Mr. Dominic FUNG	3759 9796
<i>Contract 811B</i>		
Project Manager	Mr. Brian GOWRAN	3759 9753
Acting Environmental Officer	Mr. Timmy TANG / Mr. Ben LEUNG	3759 9729

Appendix C

Implementation Status

Appendix C1 IMPLEMENTATION SCHEDULE OF THE RECOMMENDED MITIGATION MEASURES FOR CONSTRUCTION PHASE

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
Noise Control					
3.53 – 3.54	<p>The following quiet PME should be used:</p> <ul style="list-style-type: none"> • Pneumatic breaker (SWL=110dB(A)) • Tracked Excavator Fitted with Hydraulic Breaker (SWL=110dB(A)) • Truck Mixer (SWL=100dB(A)) • Tracked Crane (SWL=101dB(A)) • Dump Truck (SWL=103dB(A)) • Tracked Excavator/Loader (SWL=105dB(A)) • Dozer (SWL=111dB(A)) • Road Roller (SWL=101dB(A)) 	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Implement as per the construction programme.
3.55	Use of movable noise barriers, acoustic mats and acoustic sheds for excavator, hand-held pneumatic chipper and etc.	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Movable noise barriers have been made and placed at the excavation zone or the works areas that will generate noise nuisance, if applicable.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
3.57	<p>Good Site Practice:</p> <ul style="list-style-type: none"> • Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program; • Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction programme; • Mobile plant, if any, should be sited as far from noise sensitive receivers (NSRs) as possible; • Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum; • Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs; and • Material stockpiles and other structures should be effectively utilized, wherever practicable, in 	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Implemented as per construction programme.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
3.57	screening noise from on-site construction activities	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Implemented as per construction programme.
Air Quality Control					
Table 4.6	The excavation and sandfill areas limited to 30% actively operating and complete watering coverage of these active areas eight times a day as recommended.	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Implemented as per construction programme.
4.77	<p>Implementation of dust suppression measures stipulated in the Air Pollution Control (Construction Dust) Regulation.</p> <ul style="list-style-type: none"> • Skip hoist for material transport should be totally enclosed by impervious sheeting. • Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction site. • The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcore. 	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
4.77	<ul style="list-style-type: none"> • Where a site boundary adjoins a road, streets or other accessible to the public, hoarding of not less than 2.4m high from ground level should be provided along the entire length except for a site entrance or exit. • Every stack of more than 20 bags of cement should be placed in an area sheltered on the top and the 3 sides and be covered entirely by impervious sheeting. • All dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet. • The height from which excavated materials are dropped should be controlled to a minimum practical height to limit fugitive dust generation from falling and landing. • The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to 	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
4.77	<p>ensure dust materials do not spread from the vehicle.</p> <ul style="list-style-type: none"> Investigation of an environmental monitoring and auditing program to monitor the construction process in order to enforce controls and modify method of work if dusty conditions arise. 	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Implemented.
Water Quality Control					
5.30 -5.42	<p>General Construction Activities and Construction site run-off::</p> <ul style="list-style-type: none"> The mitigation measures as outlined in the ProPECC PN 1/94 Construction Site Drainage should be adopted where applicable. 	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented.
5.43	<p>Effluent Discharge</p> <ul style="list-style-type: none"> There is a need to apply to EPD for a discharge licence for discharge of effluent from the construction site under the WPCO. The discharge quality should meet the requirements specified in the discharge licence. Minimum distances of 100 m should be maintained between the discharge points of construction site 	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
5.43	effluent and the existing seawater intakes. If monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project, the monitoring should be carried out in accordance with the relevant WPCO licence which is under the ambit of regional office (RO) of EPD.	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented.
5.44	<p>Groundwater</p> <ul style="list-style-type: none"> No contaminated groundwater is anticipated in the works areas. Appropriate measures will be deployed to minimize the intrusion of groundwater into excavation works areas. In case seepage of uncontaminated groundwater occurs, groundwater should be pumped out from the works areas and discharged into the storm system via silt removal facilities. Ground water from dewatering process should also be discharged into the storm system via silt traps. 	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented as per construction programme.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
5.45 -5.47	<p>Accidental Spillage</p> <ul style="list-style-type: none"> Contractor must register as a chemical waste producer if chemical wastes would be produced from the construction activities. The Waste Disposal Ordinance (Cap 354) and its subsidiary regulations in particular the Waste Disposal (Chemical Waste) (General) Regulation should be observed and complied with for control of chemical wastes. Any service shop and maintenance facilities should be located on hard standings within a bunded area, and sumps and oil interceptors should be provided. Maintenance of vehicles and equipment involving activities with potential for leakage and spillage should only be undertaken within the areas appropriately equipped to control these discharges. Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance. 	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
5.45 -5.47	<p>The Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes published under the Waste Disposal Ordinance details the requirements to deal with chemical wastes. General requirements are given as follows:</p> <ul style="list-style-type: none"> ➤ Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport. ➤ Chemical waste containers should be suitably labelled, to notify and warn the personnel who are handling the wastes, to avoid accidents. ➤ Storage area should be selected at a safe location on site and adequate space should be allocated to the storage area. 	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented.
5.48 -5.49	<p>Sewage Effluent from Construction Workforce</p> <ul style="list-style-type: none"> • Sufficient chemical toilets should be provided in the works areas. A licensed 	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
5.48 -5.49	<p>waste collector should be deployed to clean the chemical toilets on a regular basis.</p> <ul style="list-style-type: none"> Notices should be posted at conspicuous locations to remind the workers not to discharge any sewage or wastewater into the nearby environment. Regular environmental audit of the construction site will provide an effective control of any malpractices and can encourage continual improvement of environmental performance on site. It is anticipated that sewage generation during the construction phase of the project would not cause water pollution problem after undertaking all required measures. 	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented.
Waste Management					
6.47	<p>All waste materials should be segregated into categories covering:</p> <ul style="list-style-type: none"> Excavated materials suitable for reuse; Inert C&D materials for disposal off-site; 	To implement on-site sorting facilitating reuse and recycling of materials as well as proper disposal of waste.	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
6.47	<ul style="list-style-type: none"> • Non-inert C&D materials for disposal at landfills; • Chemical waste; and • General refuse. 	To implement on-site sorting facilitating reuse and recycling of materials as well as proper disposal of waste.	Contractor	Throughout the whole construction phase	Implemented.
6.50	<p>Recommendations for good site practices during the construction activities include:</p> <ul style="list-style-type: none"> • Training of site personnel in, site cleanliness, proper waste management and chemical handling procedures; • Provision of sufficient waste disposal points and regular collection of waste; • Appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers; • Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; and • Separation of chemical wastes for special handling and appropriate treatment. 	To implement on-site sorting facilitating reuse and recycling of materials as well as proper disposal of waste.	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
6.51	<p>Recommendations for waste reduction measures include:</p> <ul style="list-style-type: none"> • Sorting of demolition debris and excavated materials from demolition works to recover reusable/ recyclable portions (i.e. soil, broken concrete, metal etc.); • Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal; • Encourage collection of aluminium cans by providing separate labelled bins to enable this waste to be segregated from other general refuse generated by the workforce; • Proper storage and site practices to minimize the potential for damage or contamination of construction materials; • Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary 	To implement on-site sorting facilitating reuse and recycling of materials as well as proper disposal of waste.	Contractor	Throughout the whole construction phase	Implemented as per construction programme.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
6.51	<p>generation of waste; and</p> <ul style="list-style-type: none"> • Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycle. 	To implement on-site sorting facilitating reuse and recycling of materials as well as proper disposal of waste.	Contractor	Throughout the whole construction phase	Implemented as per construction programme.
6.52	The Contractor should prepare and implement a Waste Management Plan (WMP) as a part of the Environmental Management Plan (EMP) in accordance with ETWB TCW No. 19/2005 which describes the arrangements for avoidance, reuse, recovery, recycling, storage, collection, treatment and disposal of different categories of waste to be generated from the construction activities.	To keep trace of the generation, minimization, reuse and disposal of C&D materials in the Project	Contractor	Throughout the whole construction phase	Implemented as per construction programme.
6.58	Wheel wash facilities have to be provided before the trucks leave the works area. This can reduce the introduction of dust to the public road network.	To minimise the dust impact	Contractor	Throughout the whole construction phase	Implemented.
6.60	The waste delivered to landfill should not contain any free water or have water content more than 70% by weight. Concerning the requirement on the truck load of waste to	To meet the requirement for disposal at landfill	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
6.60	landfill, the haulier must ensure suitable amount of waste would be loaded on different types of trucks used.	To meet the requirement for disposal at landfill	Contractor	Throughout the whole construction phase	Implemented.
6.56	In order to monitor the disposal of C&D materials and to control fly-tipping at PFRFs or landfills, a trip-ticket system should be established in accordance with ETWB TCW No. 31/2004. A recording system for the amount of waste generated, recycled and disposed, including the disposal sites, should also be set up. Warning signs should be put up and close-circuited television should be installed at the vehicular accesses to remind the designated disposal sites and prevent fly-tipping.	To monitor disposal of waste and control fly-tipping	Contractor	Throughout the whole construction phase	Implemented.
6.59	Wet spoil generated from the construction of pipe pile and diaphragm wall should be treated before disposal at PFRFs. With the agreement from Fill Management Department (FMD) of CEDD, wet spoil would be mixed with dry materials to reduce water content to less than 25% dry density before disposal, which reduce the impacts to the reception facilities.	To meet the requirement for disposal at landfill	Contractor	Throughout the whole construction phase	Implemented.
6.61	If chemical wastes are produced at the construction site, the Contractor would be	To properly store the chemical waste within works areas	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
6.61	required to register with the EPD as a chemical waste producer and to follow the guidelines stated in the <i>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</i> .	To properly store the chemical waste within works areas	Contractor	Throughout the whole construction phase	Implemented.
6.64	A trip-ticket system should be operated in accordance with the <i>Waste Disposal (Chemical Waste) (General) Regulation</i> to monitor all movements of chemical waste. The Contractor should employ a licensed collector to transport and dispose of the chemical wastes, to either the approved CWTC at Tsing Yi, or another licensed facility, in accordance with the <i>Waste Disposal (Chemical Waste) (General) Regulation</i> .	To monitor the generation, reuse and disposal of chemical waste	Contractor	Throughout the whole construction phase	Implemented.
6.65	General refuse should be stored in enclosed bins or compaction units separate from C&D materials and chemical waste. A reputable waste collector should be employed by the contractor to remove general refuse from the site, separately from C&D materials and chemical wastes. Preferably, an enclosed and covered area should be provided to reduce the occurrence of wind blown light material.	To properly store and separate from other C&D materials for subsequent collection and disposal	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
6.66	The recyclable component of general refuse, such as aluminium cans, paper and cleansed plastic containers should be separated from other waste. Provision and collection of recycling bins for different types of recyclable waste should be set up by the Contractor. The Contractor should also be responsible for arranging recycling companies to collect these materials. The non-recyclable components should be collected by licensed collectors employed by the Contractor on daily basis to avoid any adverse impacts on storage of refuse, which would be disposed of at designated landfills.	To facilitate recycling of recyclable portions of refuse	Contractor	Throughout the whole construction phase	Implemented.
6.67	The Contractor should carry out an education programme for workers in avoiding, reducing, reusing and recycling of materials generation. Posters and leaflets advising on the use of the bins should also be provided in the sites as reminders.	To raise workers' awareness on recycling issue	Contractor	Throughout the whole construction phase	Implemented.
Landscape and Visual Management					
Table 7.4	<ul style="list-style-type: none"> Topsoil, where identified, should be stripped and stored for re-use in the construction of the soft landscape works. 	To minimize landscape and visual impacts during construction phase	Contractor	Throughout the whole construction phase	Implemented.

EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
Table 7.4	<ul style="list-style-type: none"> • Existing trees to be retained on site should be carefully protected during construction. • Tree unavoidably to be affected by the works should be considered for transplanting in accordance with ETWB TCW No. 3/2006 - Tree Preservation and maintained until end of the establishment period. Detailed tree transplanting proposal should be submitted to seek relevant government department's approval in detailed design stage. • Compensatory tree planting provided to compensate for felled trees and maintained until end of the establishment period. • Control of night-time lighting glare • Erection of decorative screen hoarding compatible with the surrounding setting. 	To minimize landscape and visual impacts during construction phase	Contractor	Throughout the whole construction phase	Implemented.

Appendix C2 IMPLEMENTATION SCHEDULE OF THE RECOMMENDED MITIGATION MEASURES FOR OPERATIONAL PHASE

EIA / RR Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
Noise Control					
3.13 and Figure C8017/C/XRL/ENS/M52/002	<ul style="list-style-type: none"> Provision of low noise road surfacing for the Western end of existing Austin Road West near The Harbour Side. 	To reduce the traffic noise impact.	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	Implemented.
3.32 and Figure C8017/C/XRL/ENS/M52/013	<ul style="list-style-type: none"> Provision of low noise road surfacing for all new open roads. LNRS would be further extended at least 30m into the underpass at each opening. 	To reduce the traffic noise impact.	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	<ul style="list-style-type: none"> Completed. Completed.
3.31, Table 3.2 and Figure C8017/C/XRL/ENS/M52/004	<p>The following noise screening structures are proposed to protect existing NSRs. Absorptive panels will be provided to the lower portion (i.e. 2 to 3 meters) of the proposed noise screening structures in order to reduce the reflection of noise.</p> <ul style="list-style-type: none"> about 55m long of 5.5m high cantilevered noise barrier with 2.5m cantilever inclined at 45° along the southbound carriageway of Road D1A to the north of Jordan Road. 	To reduce the traffic noise impact.	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	<ul style="list-style-type: none"> Completed.

EIA / RR Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
3.31, Table 3.2 and Figure C8017/C/XRL/ENS/M52/004	<ul style="list-style-type: none"> • about 90m long of 5.5m high cantilevered noise barrier with 2m cantilever inclined at 45° along the southbound carriageway of Road D1A to the north of Jordan Road. • about 80m long of 5.5m high cantilevered noise barrier with 3m cantilever inclined at 45° along the southbound carriageway of Road D1A to the north of Jordan Road. • about 55m long of 5.5m high cantilevered noise barrier with 2.5m cantilever inclined at 45° along the central divider of Road D1A to the north of Jordan Road. • about 90m long of 5.5m high cantilevered noise barrier with 2m cantilever inclined at 45° along the central divider of Road D1A to the north of Jordan Road. • about 60m long of 5.5m high cantilevered noise barrier with 3m cantilever inclined at 45° along the central divider of Road D1A to the north of Jordan Road. 	To reduce the traffic noise impact.	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	<ul style="list-style-type: none"> • Completed. • Completed. • Completed. • Completed. • Completed

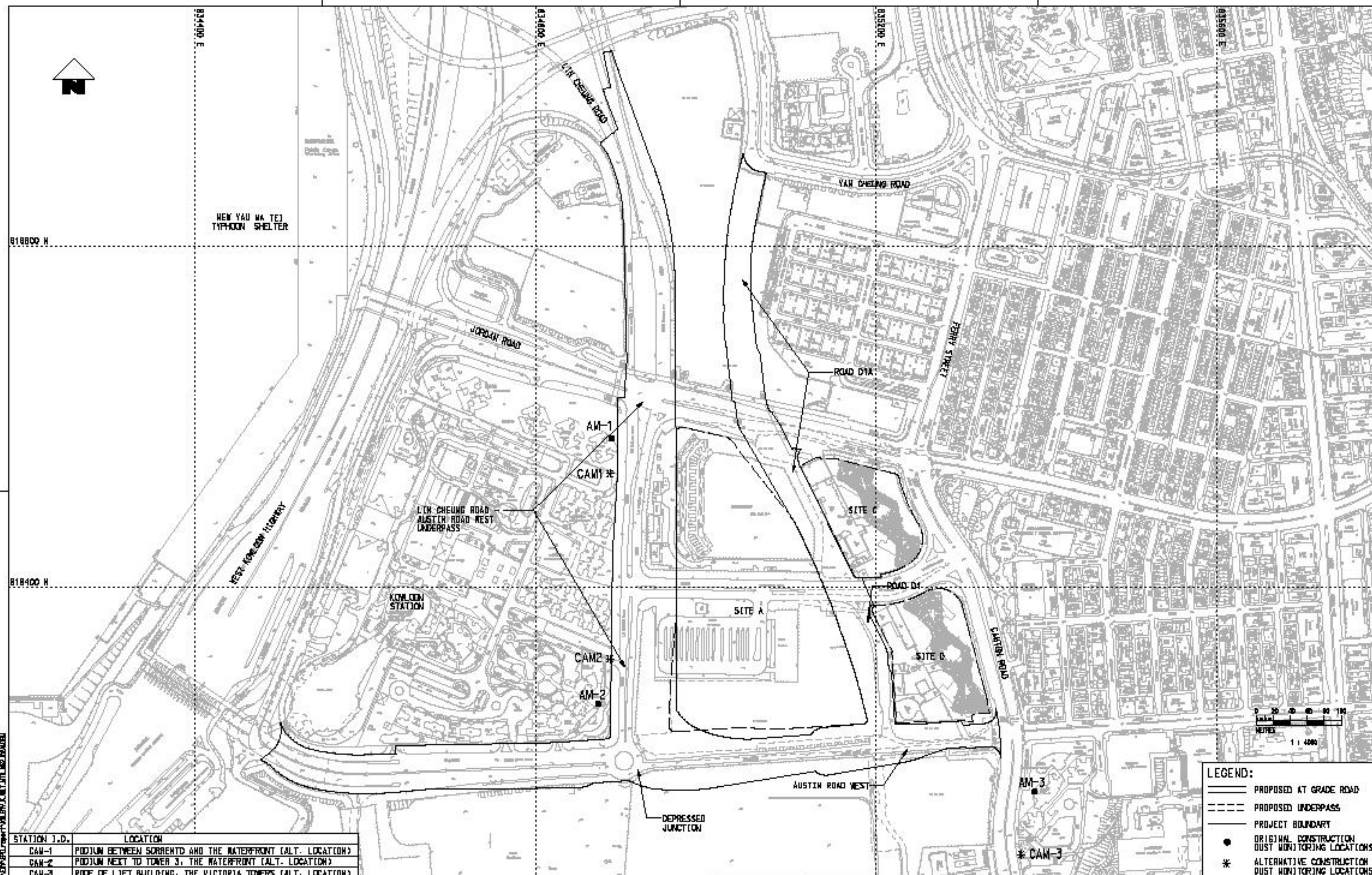
EIA / RR Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
Table 3.2 and Figure C8017/C/XRL/ENS/M52/005	<ul style="list-style-type: none"> • about 60m long of noise screening structure in the form of either landscape deck or semi-enclosure covering the main carriageway (northbound and southbound) of Lin Cheung Road to the south of Jordan Road. • about 95m long of 5.5m high cantilevered noise barrier with 4m cantilever inclined at 45° along the northbound carriageway of Lin Cheung Road to the south of Jordan Road. • about 80m long of 3m high vertical barrier on the top of retaining wall at +7.5 mPD along the northbound carriageway of Lin Cheung Road to the south of Jordan Road. • about 55m long of 5.5m high semi-enclosure with 12m overhang along the southbound carriageway of Lin Cheung Road to the south of Jordan Road. 	To reduce the traffic noise impact.	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	<ul style="list-style-type: none"> • Completed. • Completed. • Completed. • Completed.

EIA / RR Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
Table 3.2 and Figure C8017/C/XRL/ENS/M52/005	<ul style="list-style-type: none"> • about 185m long of 5.5m high cantilevered noise barrier with 2.5m cantilever inclined at 45° along the southbound carriageway of Lin Cheung Road to the south of Jordan Road. • about 160m long of 3.5m high vertical barrier along the southbound carriageway of Lin Cheung Road to the south of Jordan Road. 	To reduce the traffic noise impact.	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	<ul style="list-style-type: none"> • Completed. • Completed.
3.31, Table 3.2 and Figure C8017/C/XRL/ENS/M52/005	<p>The following noise screening structures are proposed to protect planned NSRs. Absorptive panels will be provided to the lower portion (i.e. 2 to 3 meters) of the proposed noise screening structures in order to reduce the reflection of noise.</p> <ul style="list-style-type: none"> • about 65m long of 5.5m high cantilevered noise barrier with 4m cantilever inclined at 45° along the central divider of Road D1A to the south of Jordan Road. • about 57m long of noise screening structure in the form of landscape deck and associated elevated covered walkway at the eastern end of Austin Road West. 	To reduce the traffic noise impact.	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	<ul style="list-style-type: none"> • Completed • Completed.

EIA / RR Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
3.36	<ul style="list-style-type: none"> Installation of sound-absorbing materials on all retaining walls of the underpass. For the inner walls and ceilings of the underpass, the sound-absorbing materials would be extended at least 30m into the underpass at each portal and opening being treated. 	To reduce the traffic noise impact.	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	<ul style="list-style-type: none"> Completed. Completed.
Landscape and Visual Management					
Table 4.2	<ul style="list-style-type: none"> Aesthetically pleasing design as regard to the form, material and finishes should be incorporated to landscape deck, noise barriers/enclosures, engineering structures and associated infrastructure facilities 	To minimize landscape and visual impacts during operational phase	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned to HyD	Before commencement of road operation	<ul style="list-style-type: none"> About 98% completed.
Table 4.2	<ul style="list-style-type: none"> Climbers on wire mesh to soften the noise barriers. 	To minimize landscape and visual impacts during operational phase	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned in accordance with ETW TC(W) No. 2/2004 on "Maintenance of Vegetation and Hard Landscape Features" upon completion of the detailed design for the Project	Before commencement of road operation	<ul style="list-style-type: none"> About 90-95% completed.

EIA / RR Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
Table 4.2	<ul style="list-style-type: none"> Buffer Tree and Shrub Planting to screen proposed noise barriers and enclosures 	To minimize landscape and visual impacts during operational phase	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned in accordance with ETW TC(W) No. 2/2004 on "Maintenance of Vegetation and Hard Landscape Features" upon completion of the detailed design for the Project	Before commencement of road operation	<ul style="list-style-type: none"> About 90% completed.
Table 4.2	<ul style="list-style-type: none"> Structures and ornamental tree, shrub planting should be provided along roadside amenity areas and central divider to enhance the landscape and visual quality. 	To minimize landscape and visual impacts during operational phase	MTR until maintenance or management agency is assigned. Maintenance responsibilities will be assigned in accordance with ETW TC(W) No. 2/2004 on "Maintenance of Vegetation and Hard Landscape Features" upon completion of the detailed design for the Project	Before commencement of road operation	<ul style="list-style-type: none"> About 95-98% completed.

Appendix D
Monitoring Locations



LEGEND:

- PROPOSED AT GRADE ROAD
- - - PROPOSED UNDERPASS
- PROJECT BOUNDARY
- ORIGINAL CONSTRUCTION DUST MONITORING LOCATIONS
- * ALTERNATIVE CONSTRUCTION DUST MONITORING LOCATIONS

STATION I.D.	LOCATION
CAM-1	PODIUM BETWEEN SORRENTO AND THE WATERFRONT (ALT. LOCATION)
CAM-2	PODIUM NEXT TO TOWER 3, THE WATERFRONT (ALT. LOCATION)
CAM-3	ROOF OF LEFT BUILDING, THE VICTORIA TOWERS (ALT. LOCATION)

NO.	DESCRIPTION	BY	DATE	APPROVED BY
A1	FIRST DRAFT			

DRAWN	YCC
DESIGNED	MC
CHECKED	
APPROVED	
DATE	03/APR/2011

MTR

EXPRESS RAIL LINK

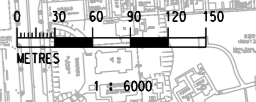
PROJECTS DIVISION | SUSTAINABILITY DEVELOPMENT DEPARTMENT

FILE NO. XRL/ENV/L/WT/MTR/M62/102

TITLE	ROADWORKS AT WEST KOWLOON LOCATIONS OF CONSTRUCTION DUST MONITORING STATIONS
SCALE	1:4000 @ A1
REVISION NO.	XRL/ENV/L/WT/MTR/M62/102
REV	A1

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LEGEND:

ID NO.	NOISE MONITORING STATION
CNM - 1	MAN CHEONG STREET REFUSE STATION (ALTERNATIVE LOCATION)
CNM - 2	TOWER 6, SORRENTO (Temporarily suspended)
CNM - 3	PODIUM NEXT TO TOWER 3, THE WATERFRONT (ALTERNATIVE LOCATION)
CNM - 4	TOWER 2, THE HARBOUR SIDE

LEGEND:

	PROPOSED AT GRADE ROAD
	PROPOSED UNDERPASS
	PROJECT BOUNDARY
	300m STUDY AREA
	ORIGINAL CONSTRUCTION NOISE MONITORING LOCATIONS
	ALTERNATIVE NOISE MONITORING LOCATION

REV	DESCRIPTION	BY	DATE	APPROVED
A1	FIRST DRAFT	YCC	05MAY11	

REV	DESCRIPTION	BY	DATE	APPROVED

DRAWN	YCC
DESIGNED	
CHECKED	MC
APPROVED	
DATE	03/MAY/2011

MTR

EXPRESS RAIL LINK

ORIGINATOR

PROJECTS DIVISION | **SUSTAINABILITY DEVELOPMENT DEPARTMENT**

CADD REF. XRLNV_K_WKT_MTR_M52_101A1.DGN

TITLE	ROADWORK AT WEST KOWLOON LOCATION OF CONSTRUCTION NOISE MONITORING STATION	
SCALE	1:6000 @ A3	DRAWING NO.
		XRLNV/K/WKT/MTR/M52/101
REV.		A1

Appendix E
Monitoring Schedule

Actual Construction Dust (24-hr TSP) and Air-borne Noise Impact Monitoring Schedule - February 2019

Notes: **TSP** denotes Total Suspended Particulates

* denotes that the noise monitoring at CNM-2 has been temporarily suspended since objection was received from the OC of Sorrento

Feb-2019						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2 CAM-1, CAM-2, CAM-3
3	4 CNM-3	5	6	7	8 CAM-1, CAM-2, CAM-3 CNM-1, CNM-4	9
10	11	12	13 CNM-1, CNM-3, CNM-4	14 CAM-1, CAM-2, CAM-3	15	16
17	18	19	20 CNM-1, CNM-3, CNM-4 CAM-1, CAM-2, CAM-3	21	22	23
24	25	26 CAM-1, CAM-2, CAM-3	27 CNM-1, CNM-3, CNM-4	28		

Tentative Construction Dust (24-hr TSP) and Air-borne Noise Impact Monitoring Schedule - March 2019

Notes: **TSP** denotes Total Suspended Particulates

* denotes that the noise monitoring at CNM-2 has been temporarily suspended since objection was received from the OC of Sorrento

Mar-2019						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4 CAM-1, CAM-2, CAM-3	5	6 CNM-1, CNM-3, CNM-4	7	8	9 CAM-1, CAM-2, CAM-3
10	11	12	13 CNM-1, CNM-3, CNM-4	14	15 CAM-1, CAM-2, CAM-3	16
17	18	19	20 CNM-1, CNM-3, CNM-4	21 CAM-1, CAM-2, CAM-3	22	23
24	25	26	27 CNM-1, CNM-3, CNM-4 CAM-1, CAM-2, CAM-3	28	29	30
31						

Appendix F
Graphical Plots of
Monitoring Results

APPENDIX F: Air Quality Monitoring Results - 24-hour TSP Monitoring

- CAM-1

Date	24-hour TSP Monitoring Results	Action Level	Limit Level
	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
02-Feb-19	66.3	168.8	260.0
08-Feb-19	53.2	168.8	260.0
14-Feb-19	36.4	168.8	260.0
20-Feb-19	51.8	168.8	260.0
26-Feb-19	67.2	168.8	260.0

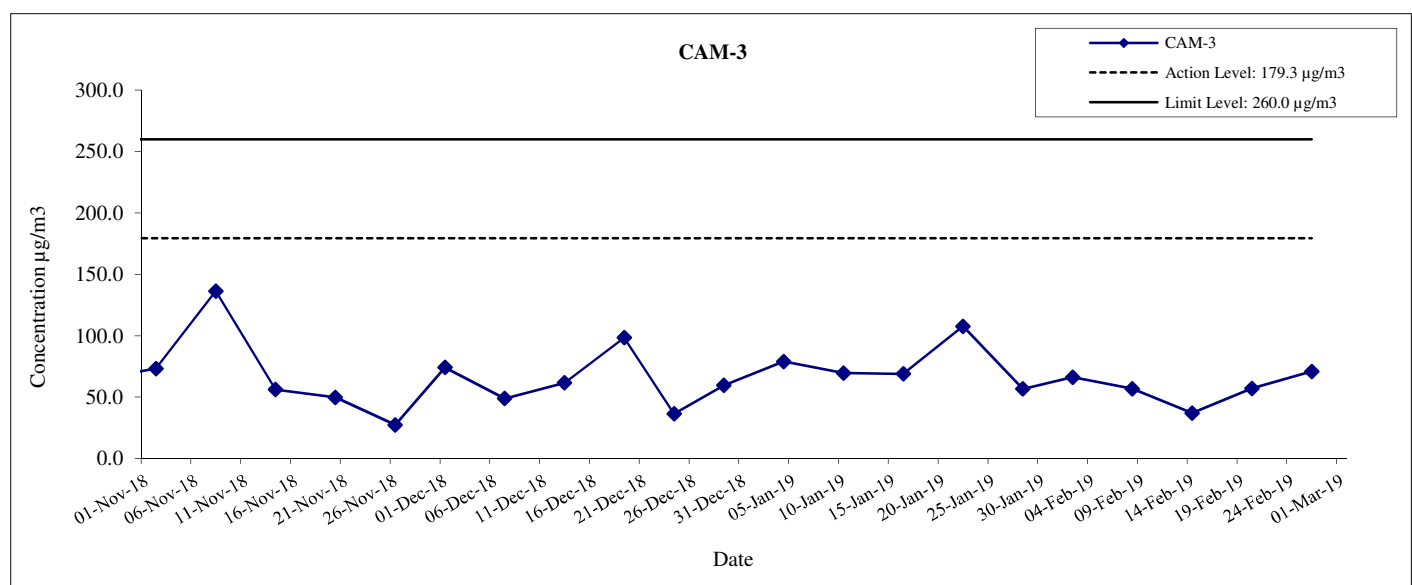
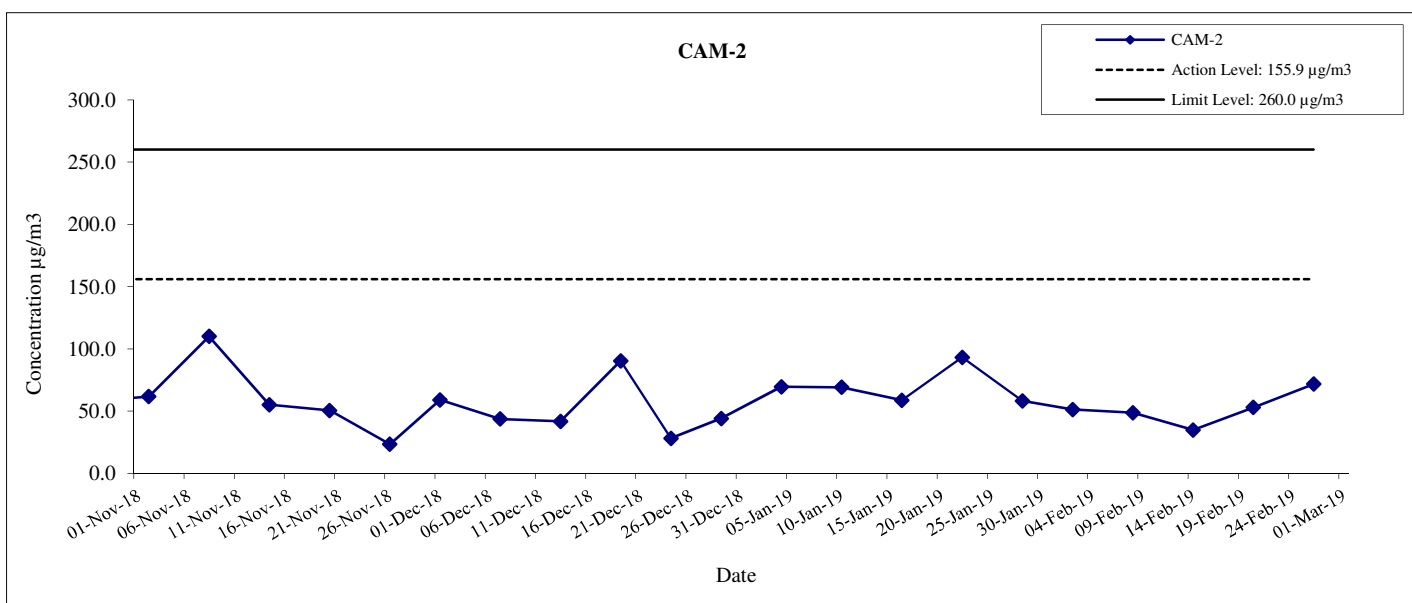
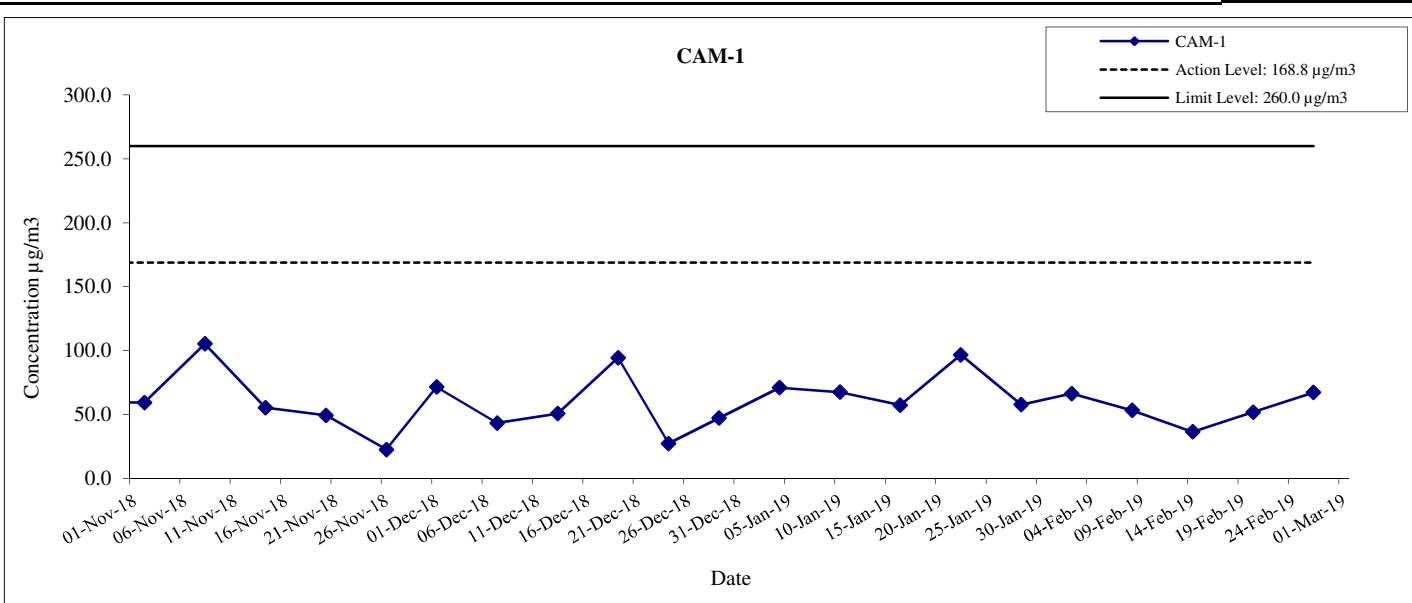
- CAM-2

Date	24-hour TSP Monitoring Results	Action Level	Limit Level
	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
02-Feb-19	51.3	155.9	260.0
08-Feb-19	48.8	155.9	260.0
14-Feb-19	34.9	155.9	260.0
20-Feb-19	53.0	155.9	260.0
26-Feb-19	71.7	155.9	260.0

- CAM-3

Date	24-hour TSP Monitoring Results	Action Level	Limit Level
	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)	($\mu\text{g}/\text{m}^3$)
02-Feb-19	66.2	179.3	260.0
08-Feb-19	56.8	179.3	260.0
14-Feb-19	37.0	179.3	260.0
20-Feb-19	57.1	179.3	260.0
26-Feb-19	70.9	179.3	260.0

Remark: 1. Bold value indicated an Action level exceedance
 2. Bold & Italic value indicated an Limit level exceedance



Hong Kong Section of Guangzhou-Shenzhen-Hong Kong
Express Rail Link

**Graphical Presentation of 24-hour TSP Monitoring
Results for Location CAM-1, CAM-2 and CAM-3**

DATE

Feb-19

APPENDIX

F

APPENDIX F: Noise Monitoring Results

- CNM-1

Date	Noise Monitoring Results	Limit Level	Exceedance?
	Leq, dB(A)	Leq, dB(A)	
08-Feb-19	62	75	N
13-Feb-19	60	75	N
20-Feb-19	61	75	N
27-Feb-19	66	75	N

- CNM-2 ^[b]

Date	Noise Monitoring Results	Limit Level	Exceedance?
	Leq, dB(A)	Leq, dB(A)	
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

- CNM-3 ^[a]

Date	Noise Monitoring Results	Limit Level	Exceedance?
	Leq, dB(A)	Leq, dB(A)	
04-Feb-19	63	75	N
13-Feb-19	61	75	N
20-Feb-19	63	75	N
27-Feb-19	66	75	N

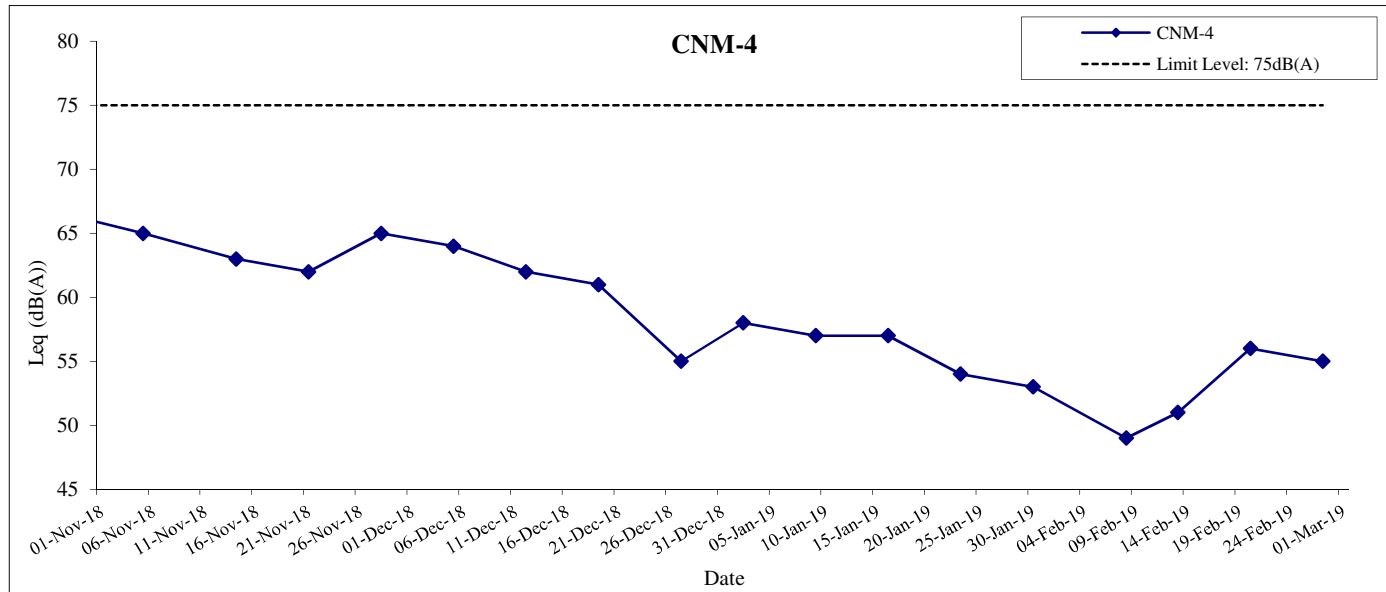
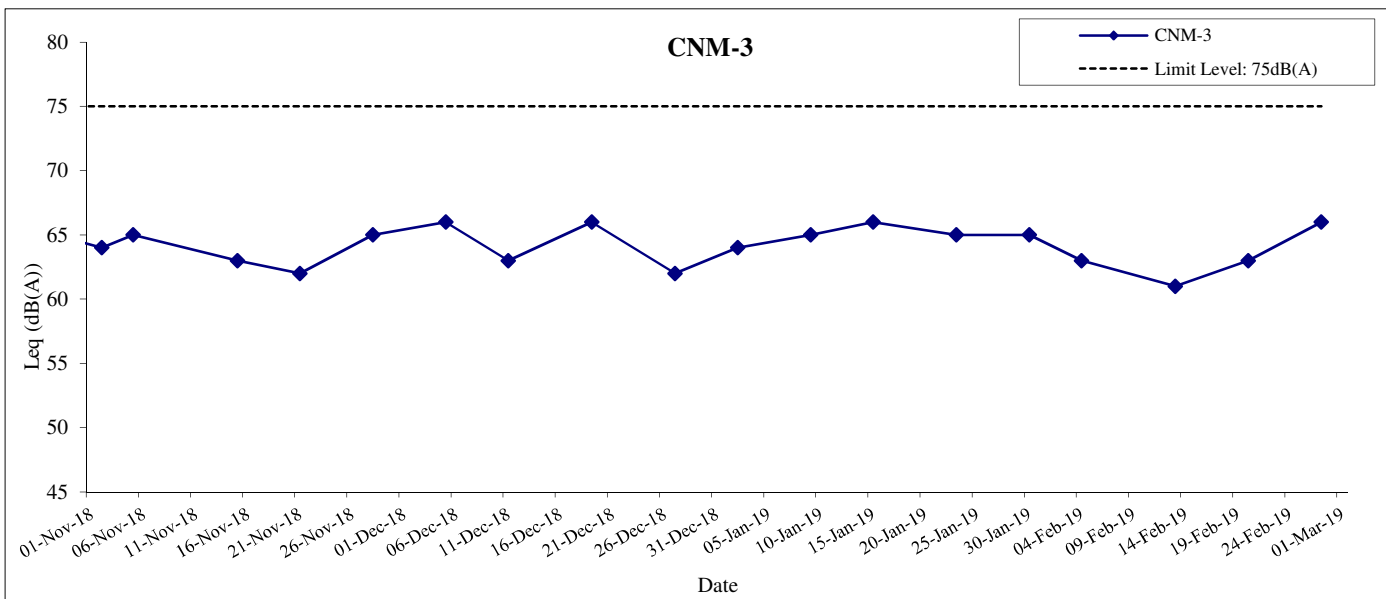
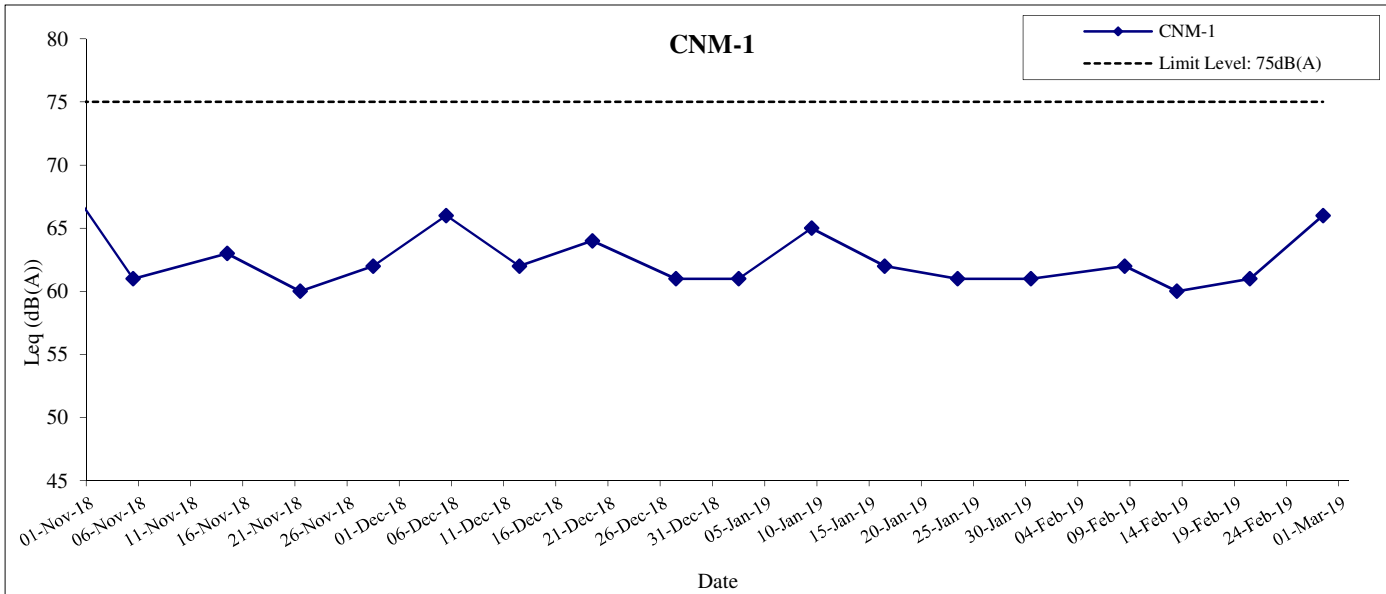
- CNM-4

Date	Noise Monitoring Results	Limit Level	Exceedance?
	Leq, dB(A)	Leq, dB(A)	
08-Feb-19	49	75	N
13-Feb-19	51	75	N
20-Feb-19	56	75	N
27-Feb-19	55	75	N

Note:

[a]. Facade correction of +3dB(A) would be added to the results taken at CNM-3 due to free-field noise measurements.

[b]. Noise monitoring has been temporarily suspended from 25-Aug-2014 since objection has been received from the OC of Sorrento.



Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link

Graphical Presentation of Noise Monitoring Results for Locations CNM-1, CNM-3 & CNM-4

DATE

Feb-19

APPENDIX

F

Appendix G
Meteorological Data

**EXTRACT OF METEOROLOGICAL OBSERVATIONS FOR HONG KONG,
FEBRUARY 2019 (Table 1)**

Date FEBRUARY	Mean Pressure (hPa)	Air Temperature			Mean Dew Point Temperature (deg. C)	Mean Relative Humidity (%)	Mean Amount of Cloud (%)	Total Rainfall (mm)
		Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)				
1	1021.6	22.0	18.8	17.6	13.1	70	84	-
2	1018.4	20.7	18.6	16.9	15.1	80	84	Trace
3	1017.2	25.3	21.8	19.6	18.7	83	70	Trace
4	1018.1	25.5	21.7	19.5	18.7	83	61	-
5	1017.4	22.3	20.1	18.2	17.3	84	84	-
6	1014.5	24.9	22.1	20.5	19.5	85	83	-
7	1014.8	25.8	23.0	21.3	19.9	83	57	Trace
8	1015.3	25.1	21.7	19.7	19.5	87	78	Trace
9	1017.9	20.1	19.3	18.4	17.6	90	99	0.8
10	1021.7	18.8	18.0	17.4	16.3	90	89	0.8
11	1024.3	19.4	18.4	17.3	15.9	85	94	Trace
12	1024.2	21.9	19.0	16.9	15.8	82	69	0.2
13	1021.8	25.1	21.1	19.0	17.6	80	68	-
14	1020.6	23.2	20.4	18.5	17.5	83	78	Trace
15	1019.9	22.4	20.4	18.8	17.5	84	84	0.2
16	1017.9	26.0	22.4	20.1	18.8	81	72	-
17	1017.8	20.2	18.8	18.0	16.4	86	91	0.1
18	1015.4	19.3	17.9	16.8	16.4	90	91	18.1
19	1016.8	23.8	20.3	18.5	18.8	91	79	31.0
20	1018.5	25.6	22.6	20.8	21.2	92	84	0.2
21	1017.4	23.2	21.4	20.4	20.2	93	88	Trace
22	1017.2	24.3	20.4	18.4	17.2	82	79	1.6
23	1015.8	20.5	18.1	15.6	15.9	87	95	12.3

Date FEBRUARY	Mean Pressure (hPa)	Air Temperature			Mean Dew Point Temperature (deg. C)	Mean Relative Humidity (%)	Mean Amount of Cloud (%)	Total Rainfall (mm)
		Maximum (deg. C)	Mean (deg. C)	Minimum (deg. C)				
24	1016.9	19.5	16.9	14.1	14.0	83	88	3.4
25	1017.5	18.9	18.0	16.7	15.4	85	92	Trace
26	1017.6	19.7	18.7	17.6	16.7	88	96	Trace
27	1015.5	23.6	20.7	18.6	18.0	85	82	Trace
28	1014.7	26.7	22.8	20.6	20.0	85	67	-
Mean/Total	1018.1	22.6	20.1	18.4	17.5	85	82	68.7
Normal*	1018.5	18.9	16.8	15.0	13.0	80	74	54.4
Station	Hong Kong Observatory							

**EXTRACT OF METEOROLOGICAL OBSERVATIONS FOR HONG KONG,
FEBRUARY 2019 (Table 2)**

Date FEBRUARY	Number of hours of Reduced Visibility# (hours)	Total Bright Sunshine (hours)	Daily Global Solar Radiation (MJ/m ²)	Total Evaporation (mm)	Prevailing Wind Direction (degrees)	Mean Wind Speed (km/h)
1	0	-	6.77	2.2	010	25.7
2	0	5.1	13.71	1.8	050	28.6
3	4	7.8	14.97	1.8	020	11.3
4	5	7.4	15.35	3.5	070	12.8
5	3	4.3	12.39	1.7	050	23.7
6	0	3.7	10.35	1.6	030	12.3
7	0	7.1	13.80	2.2	170	9.0
8	0	4.4	10.44	2.5	070	22.8
9	0	-	5.99	1.7	070	38.8
10	0	-	4.51	1.2	060	41.6

Date FEBRUARY	Number of hours of Reduced Visibility# (hours)	Total Bright Sunshine (hours)	Daily Global Solar Radiation (MJ/m²)	Total Evaporation (mm)	Prevailing Wind Direction (degrees)	Mean Wind Speed (km/h)
11	2	-	4.32	1.0	040	27.3
12	0	8.1	17.98	2.7	060	23.8
13	0	3.5	10.77	2.2	030	14.7
14	0	7.3	16.60	3.0	060	28.8
15	0	2.6	12.18	1.9	060	24.9
16	0	9.8	18.50	3.9	070	17.6
17	0	0.8	7.19	1.9	070	43.4
18	0	0.2	2.42	0.7	070	35.3
19	0	3.8	11.47	1.9	030	22.0
20	0	1.2	9.12	1.7	010	13.8
21	2	3.1	12.48	2.7	030	17.6
22	1	4.6	15.79	3.7	360	18.4
23	0	-	3.42	0.7	060	36.5
24	0	0.7	9.39	1.6	010	17.9
25	2	-	4.19	1.1	030	20.0
26	1	0.1	5.26	0.5	060	34.5
27	0	5.7	15.52	1.9	040	20.2
28	1	5.6	12.86	2.5	020	12.7
Mean/Total	21	96.9	10.63	55.8	060	23.4
Normal*	127.6 [§]	94.2	9.39	59.9	070	24.5
Station	Hong Kong International Airport	King's Park		Waglan Island [^]		

The minimum pressure recorded at the Hong Kong Observatory was 1012.7 hectopascals at 1835 HKT on 6 February.

The maximum air temperature recorded at the Hong Kong Observatory was 26.7 degrees C at 1442 HKT on 28 February.

The minimum air temperature recorded at the Hong Kong Observatory was 14.1 degrees C at 0725 HKT on 24 February.

The maximum gust peak speed recorded at Waglan Island was 70 kilometres per hour from 090 degrees at 1215 HKT on 18 February.

The maximum 1-minute mean rainfall rate recorded at the Hong Kong Observatory was 118 millimetres per hour at 0919 HKT on 19 February.

Reduced visibility refers to visibility below 8 kilometres when there is no fog, mist, or precipitation.

- The visibility readings at the Hong Kong International Airport are based on hourly observations by professional meteorological observers in 2004 and before, and average readings over the 10-minute period before the clock hour of the visibility meter near the middle of the south runway from 2005 onwards. The change of the data source in 2005 is an improvement of the visibility assessment using instrumented observations following the international trend.
- Before 10 October 2007, the number of hours of reduced visibility at the Hong Kong International Airport in 2005 and thereafter displayed in this web page was based on hourly visibility observations by professional meteorological observers. Since 10 October 2007, the data have been revised using the average visibility readings over the 10-minute period before the clock hour, as recorded by the visibility meter near the middle of the south runway.

^ In case the data are not available from Waglan Island, observations of Cheung Chau or other nearby weather stations will be incorporated in computing the Prevailing Wind Direction and Mean Wind Speed.

* 1981 - 2010 Climatological Normal, unless otherwise specified

§ 1997 - 2018 Mean value

Appendix H
Calibration Certificate of
Sound Level Meters



CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0929 02 Page 1 of 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250-L	4950	ZC0032
Serial/Equipment No.:	2718888	2678774	13285
Adaptors used:	-	-	-

Item submitted by

Customer Name: Anewr Consulting Limited
Address of Customer: Unit 517, 5/F Tower A, Regent Centre, 63 Wo Yip Hop Road, Kwai Chung
Request No.: -
Date of receipt: 29-Sep-2017

Date of test: 30-Sep-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	08-Sep-2018	CIGISMEC
Signal generator	DS 360	33873	25-Apr-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

- 1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- 2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of $\pm 20\%$.
- 3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsiveness of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory:


Huang Jia Min/Feng Jun Qi

Date: 30-Sep-2017

Company Chop:



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.:

17CA0929 02

Page 2 of 2

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Frequency weightings	A	Pass	0.3
Time weightings	C	Pass	0.3	
	Lin	Pass	0.3	
	Single Burst Fast	Pass	0.3	
Peak response	Single Burst Slow	Pass	0.3	
	Single 100µs rectangular pulse	Pass	0.3	
R.M.S. accuracy	Crest factor of 3	Pass	0.3	
Time weighting I	Single burst 5 ms at 2000 Hz	Pass	0.3	
	Repeated at frequency of 100 Hz	Pass	0.3	
Time averaging	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
Pulse range	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	


3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.


- End -

Calibrated by:


Lai Sheng Jie

Date: 30-Sep-2017

Checked by:


Fung Chi Yip

Date: 30-Sep-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.



Test Data for Sound Level Meter

Page 1 of 5

Sound level meter type:	2250-L	Serial No.	2718888	Date	30-Sep-2017
Microphone type:	4950	Serial No.	2678774	Report:	17CA0929 02
Preamp type:	ZC0032	Serial No.	13285		

SELF GENERATED NOISE TEST

The noise test is performed in the most sensitive range of the SLM with the microphone replaced by an equivalent impedance.

Noise level in A weighting	14.5	dB
Noise level in C weighting	16.6	dB
Noise level in Lin	23.3	dB

LINEARITY TEST

The linearity is tested relative to the reference sound pressure level using a continuous sinusoidal signal of frequency 4 kHz. The measurement is made on the reference range for indications at 5 dB intervals starting from the 94 dB reference sound pressure level. And until within 5 dB of the upper and lower limits of the reference range, the measurements shall be made at 1 dB intervals.(SLM set to LEQ/SPL)

Reference/Expected level	Actual level		Tolerance	Deviation	
	non-integrated	integrated		non-integrated	integrated
dB	dB	dB	+/- dB	dB	dB
94.0	94.0	94.0	0.7	0.0	0.0
99.0	99.0	99.0	0.7	0.0	0.0
104.0	104.0	104.0	0.7	0.0	0.0
109.0	109.0	109.0	0.7	0.0	0.0
114.0	114.0	114.0	0.7	0.0	0.0
119.0	119.0	119.0	0.7	0.0	0.0
124.0	124.0	124.0	0.7	0.0	0.0
129.0	129.0	129.0	0.7	0.0	0.0
134.0	134.0	134.0	0.7	0.0	0.0
135.0	135.0	135.0	0.7	0.0	0.0
136.0	136.0	136.0	0.7	0.0	0.0
137.0	137.0	137.0	0.7	0.0	0.0
138.0	138.0	138.0	0.7	0.0	0.0
139.0	139.0	139.0	0.7	0.0	0.0
140.0	140.0	140.0	0.7	0.0	0.0
89.0	89.0	89.0	0.7	0.0	0.0
84.0	84.0	84.0	0.7	0.0	0.0
79.0	79.0	79.0	0.7	0.0	0.0
74.0	74.0	74.0	0.7	0.0	0.0
69.0	69.0	69.0	0.7	0.0	0.0
64.0	64.0	64.0	0.7	0.0	0.0
59.0	59.0	59.0	0.7	0.0	0.0
54.0	54.0	54.0	0.7	0.0	0.0
49.0	49.0	49.0	0.7	0.0	0.0
44.0	44.0	44.0	0.7	0.0	0.0
39.0	39.0	39.0	0.7	0.0	0.0



Test Data for Sound Level Meter

Page 2 of 5

Sound level meter type:	2250-L	Serial No.	2718888	Date	30-Sep-2017
Microphone type:	4950	Serial No.	2678774	Report:	17CA0929 02
Preamp type:	ZC0032	Serial No.	13285		
34.0	34.0	34.0	0.7	0.0	0.0
33.0	33.0	33.0	0.7	0.0	0.0
32.0	32.0	32.0	0.7	0.0	0.0
31.0	31.0	31.0	0.7	0.0	0.0
30.0	30.0	30.0	0.7	0.0	0.0

Measurements for an indication of the reference SPL on all other ranges which include it

Other ranges	Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	94.0	94.0	0.7	0.0

Measurements on all level ranges for indications 2 dB below the upper limit and 2 dB above the lower limit

Ranges	Reference/Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	30.0	30.0	0.7	0.0
	138.0	138.0	0.7	0.0

FREQUENCY WEIGHTING TEST

The frequency response of the weighting networks are tested at octave intervals over the frequency ranges 31.5 Hz to 12500 Hz. The signal level at 1000 Hz is set to give an indication of the reference SPL.

Frequency weighting A:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	54.6	0.0	54.6	1.5	1.5	0.0
63.1	94.0	67.8	0.0	67.8	1.5	1.5	0.0
125.9	94.0	77.9	0.0	77.9	1.0	1.0	0.0
251.2	94.0	85.4	0.0	85.4	1.0	1.0	0.0
501.2	94.0	90.8	0.0	90.8	1.0	1.0	0.0
1995.0	94.0	95.2	0.0	95.2	1.0	1.0	0.0
3981.0	94.0	95.0	-0.1	94.9	1.0	1.0	0.0
7943.0	94.0	92.9	-0.3	92.6	1.5	3.0	0.0
12590.0	94.0	89.7	-0.3	89.4	3.0	6.0	0.0

Frequency weighting C:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	91.0	0.0	91.1	1.5	1.5	0.1
63.1	94.0	93.2	0.0	93.2	1.5	1.5	0.0
125.9	94.0	93.8	0.0	93.8	1.0	1.0	0.0



Test Data for Sound Level Meter

Sound level meter type:	2250-L	Serial No.	2718888	Date	30-Sep-2017
Microphone type:	4950	Serial No.	2678774	Report:	17CA0929 02
Preamp type:	ZC0032	Serial No.	13285		

251.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
1995.0	94.0	93.8	0.0	93.8	1.0	1.0	0.0
3981.0	94.0	93.2	-0.1	93.1	1.0	1.0	0.0
7943.0	94.0	91.0	-0.3	90.7	1.5	3.0	0.0
12590.0	94.0	87.8	-0.3	87.4	3.0	6.0	-0.1

Frequency weighting Lin:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
					+	-	
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	94.0	0.0	94.0	1.5	1.5	0.0
63.1	94.0	94.0	0.0	94.0	1.5	1.5	0.0
125.9	94.0	94.0	0.0	94.0	1.0	1.0	0.0
251.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
1995.0	94.0	94.0	0.0	94.0	1.0	1.0	0.0
3981.0	94.0	94.0	-0.1	93.9	1.0	1.0	0.0
7943.0	94.0	94.0	-0.3	93.7	1.5	3.0	0.0
12590.0	94.0	94.0	-0.3	93.7	3.0	6.0	0.0

*Deviation = Actual level - (Expected level + Correction of electrical response)

The correction of electrical response is specified in the Table A.2 of technical documentation of BE 1853-11. The maximum expanded uncertainty of correction of electrical response is 0.3 dB.

TIME WEIGHTING FAST TEST

Time weighting F is tested on the reference range with a single sinusoidal burst of duration 200 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
			+	-	
dB	dB	dB	+	-	dB
116.0	115.0	115.0	1.0	1.0	0.0

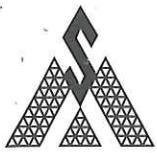
TIME WEIGHTING SLOW TEST

Time weighting S is tested on the reference range with a single sinusoidal burst of duration 500 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
			+	-	
dB	dB	dB	+	-	dB
116.0	111.9	111.9	1.0	1.0	0.0

PEAK RESPONSE TEST

The onset time of the peak detector is tested on the reference range by comparing the response to a 100 us rectangular test pulse with the response to a 10 ms reference pulse of the same amplitude. The amplitude of the



Test Data for Sound Level Meter

Page 4 of 5

Sound level meter type: 2250-L Serial No. 2718888 Date 30-Sep-2017
Microphone type: 4950 Serial No. 2678774
Preamp type: ZC0032 Serial No. 13285 Report: 17CA0929 02

10 ms reference pulse is such as to produce an indication 1 dB below the upper limit of the primary indicator range.

Positive polarities: (Weighting L, set the generator signal to single, LLPeak)

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.2	2.0	0.2

Negative polarities:

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.3	2.0	0.3

RMS ACCURACY TEST

The RMS detector accuracy is tested on the reference range for a crest factor of 3.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz. (Set to INT)

	Ref. Level	Expected level	Tone burst signal	Tolerance	Deviation
Time weighting	dB	dB	indication(dB)	+/- dB	dB
Slow	118.0+6.6	118.0	118.0	0.5	0.0

TIME WEIGHTING IMPULSE TEST

Time weighting I is tested on the reference range (Set the SLM to LAImax)

Test frequency: 2000 Hz
Amplitude: The upper limit of the primary indicator range.

Single sinusoidal burst of duration 5 ms:

Ref. Level	Single burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	111.2	111.1	2.0	-0.1

Repeated at 100 Hz

Ref. Level	Repeated burst indication		Tolerance	Deviation
dB	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	117.3	117.2	1.0	-0.1

TIME AVERAGING TEST

This test compares the SLM reading for continuous sine signals with readings obtained from a sine tone burst sequence having the same RMS level. The test level is 30 dB below the upper limit of the linearity range and repeated for Type 1 SLM with 40 dB below the upper limit of the linearity.

Frequency of tone burst: 4000 Hz

Duration of tone burst: 1 ms

Repetition Time	Level of tone burst	Expected Leq	Actual Leq	Tolerance	Deviation	Remarks
msec	dB	dB	dB	+/- dB	dB	
1000	110.0	110.0	109.9	1.0	-0.1	60s integ.
10000	100.0	100.0	100.0	1.0	0.0	6min. integ.



Test Data for Sound Level Meter

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Sound level meter type:	2250-L	Serial No.	2718888	Date	30-Sep-2017
Microphone type:	4950	Serial No.	2678774	Report:	17CA0929 02
Preamp type:	ZC0032	Serial No.	13285		

PULSE RANGE AND SOUND EXPOSURE LEVEL TEST

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range

Test frequency: 4000 Hz
Integration time: 10 sec

The integrating sound level meter set to Leq:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10	88.0	58.0	57.9	1.7	-0.1

The integrating sound level meter set to SEL:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10.0	88.0	68.0	67.9	1.7	-0.1

OVERLOAD INDICATION TEST

For SLM capable of operating in a non-integrating mode.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz.

Level	Level reduced by	Further reduced	Difference	Tolerance	Deviation
at overload (dB)	1 dB	3 dB	dB	dB	dB
137.0	136.0	133.0	3.0	1.0	0.0

For integrating SLM, with the instrument indicating Leq.

For integrating SLM, with the instrument indicating Leq and set to the reference range. The test signal as following:
The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range
Test frequency: 4000 Hz
Integration time: 10 sec
Single burst duration: 1 msec

Rms level	Level reduced by	Expected level	Actual level	Tolerance	Deviation
at overload (dB)	1 dB	dB	dB	dB	dB
143.6	142.7	102.7	102.6	2.2	-0.1

ACOUSTIC TEST

The acoustic test of the complete SLM is tested at the frequency 125 Hz and 8000 Hz using a B&K type 4226 Multifunction Acoustic Calibrator. The test is performed in A weighting.

Frequency	Expected level	Actual level	Tolerance (dB)		Deviation
			+	-	
Hz	dB	Measured (dB)			dB
1000	94.0	94.0	0.0	0.0	0.0
125	77.9	78.0	1.0	1.0	0.1
8000	92.9	90.5	1.5	3.0	-2.4

-----END-----



CERTIFICATE OF CALIBRATION

Certificate No.: 17CA0902 02-01

Page 1 of 2

Item tested

Description:	Sound Level Meter (Type 1)	Microphone	Preamp
Manufacturer:	B & K	B & K	B & K
Type/Model No.:	2250	4950	ZC0032
Serial/Equipment No.:	2718891	2698651	13278
Adaptors used:	-	-	-

Item submitted by

Customer Name: Anewr Consulting Limited
Address of Customer: Unit 517, 5/F Tower A, Regent Centre, 63 Wo Yip Hop Road, Kwai Chung
Request No.: -
Date of receipt: 02-Sep-2017

Date of test: 09-Sep-2017

Reference equipment used in the calibration

Description:	Model:	Serial No.	Expiry Date:	Traceable to:
Multi function sound calibrator	B&K 4226	2288444	08-Sep-2018	CIGISMEC
Signal generator	DS 360	33873	25-Apr-2018	CEPREI
Signal generator	DS 360	61227	01-Apr-2018	CEPREI

Ambient conditions

Temperature: 21 ± 1 °C
Relative humidity: 50 ± 10 %
Air pressure: 1010 ± 5 hPa

Test specifications

- 1, The Sound Level Meter has been calibrated in accordance with the requirements as specified in BS 7580: Part 1: 1997 and the lab calibration procedure SMTP004-CA-152.
- 2, The electrical tests were performed using an electrical signal substituted for the microphone which was removed and replaced by an equivalent capacitance within a tolerance of $\pm 20\%$.
- 3, The acoustic calibration was performed using an B&K 4226 sound calibrator and corrections was applied for the difference between the free-field and pressure responsiveness of the Sound Level Meter.

Test results

This is to certify that the Sound Level Meter conforms to BS 7580: Part 1: 1997 for the conditions under which the test was performed.

Details of the performed measurements are presented on page 2 of this certificate.

Actual Measurement data are documented on worksheets.

Approved Signatory:


Huang Jian Min/Feng Jun Qi

Date: 09-Sep-2017

Company Chop:



Comments: The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the long-term stability of the instrument.



CERTIFICATE OF CALIBRATION

(Continuation Page)

Certificate No.: 17CA0902 02-01

Page 2 of 2

1, Electrical Tests

The electrical tests were performed using an equivalent capacitance substituted for the microphone. The results are given in below with test status and the estimated uncertainties. The "Pass" means the result of the test is inside the tolerances stated in the test specifications. The "-" means the result of test is outside these tolerances.

Test:	Subtest:	Status:	Expanded Uncertainty (dB)	Coverage Factor
Self-generated noise	A	Pass	0.3	
	C	Pass	0.8	
	Lin	Pass	1.6	
Linearity range for Leq	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Reference SPL on all other ranges	Pass	0.3	
	2 dB below upper limit of each range	Pass	0.3	
	2 dB above lower limit of each range	Pass	0.3	
Linearity range for SPL	At reference range, Step 5 dB at 4 kHz	Pass	0.3	
	Frequency weightings			
Time weightings	A	Pass	0.3	
	C	Pass	0.3	
	Lin	Pass	0.3	
Peak response	Single Burst Fast	Pass	0.3	
	Single Burst Slow	Pass	0.3	
R.M.S. accuracy	Single 100µs rectangular pulse	Pass	0.3	
Time weighting I	Crest factor of 3	Pass	0.3	
	Single burst 5 ms at 2000 Hz	Pass	0.3	
Time averaging	Repeated at frequency of 100 Hz	Pass	0.3	
	1 ms burst duty factor 1/10 ³ at 4kHz	Pass	0.3	
Pulse range	1 ms burst duty factor 1/10 ⁴ at 4kHz	Pass	0.3	
	Single burst 10 ms at 4 kHz	Pass	0.4	
Sound exposure level	Single burst 10 ms at 4 kHz	Pass	0.4	
Overload indication	SPL	Pass	0.3	
	Leq	Pass	0.4	

2, Acoustic tests

The complete sound level meter was calibrated on the reference range using a B&K 4226 acoustic calibrator with 1000Hz and SPL 94 dB. The sensitivity of the sound level meter was adjusted. The test result at 125 Hz and 8000 Hz are given in below with test status and the estimated uncertainties.

Test:	Subtest	Status	Expanded Uncertainty (dB)	Coverage Factor
Acoustic response	Weighting A at 125 Hz	Pass	0.3	
	Weighting A at 8000 Hz	Pass	0.5	

3, Response to associated sound calibrator

N/A

The expanded uncertainties have been calculated in accordance with the ISO Publication "Guide to the expression of uncertainty in measurement", and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2 is assumed unless explicitly stated.

Calibrated by:

Lai Sheng Jie

Date: 09-Sep-2017

- End -

Checked by:

Fung Chi Yip

Date: 09-Sep-2017

The standard(s) and equipment used in the calibration are traceable to national or international recognised standards and are calibrated on a schedule to maintain the required accuracy level.



Test Data for Sound Level Meter

Page 1 of 5

Sound level meter type:	2250	Serial No.	2718891	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2698651		
Preamp type:	ZC0032	Serial No.	13278	Report:	17CA0902 02-01

SELF GENERATED NOISE TEST

The noise test is performed in the most sensitive range of the SLM with the microphone replaced by an equivalent impedance.

Noise level in A weighting	15.4	dB
Noise level in C weighting	17.5	dB
Noise level in Lin	25.3	dB

LINEARITY TEST

The linearity is tested relative to the reference sound pressure level using a continuous sinusoidal signal of frequency 4 kHz. The measurement is made on the reference range for indications at 5 dB intervals starting from the 94 dB reference sound pressure level. And until within 5 dB of the upper and lower limits of the reference range, the measurements shall be made at 1 dB intervals. (SLM set to LEQ/SPL)

Reference/Expected level	Actual level		Tolerance	Deviation	
	non-integrated	integrated		non-integrated	integrated
dB	dB	dB	+/- dB	dB	dB
94.0	94.0	94.0	0.7	0.0	0.0
99.0	99.0	99.0	0.7	0.0	0.0
104.0	104.0	104.0	0.7	0.0	0.0
109.0	109.0	109.0	0.7	0.0	0.0
114.0	114.0	114.0	0.7	0.0	0.0
119.0	119.0	119.0	0.7	0.0	0.0
124.0	124.0	124.0	0.7	0.0	0.0
129.0	129.0	129.0	0.7	0.0	0.0
134.0	134.0	134.0	0.7	0.0	0.0
135.0	135.0	135.0	0.7	0.0	0.0
136.0	136.0	136.0	0.7	0.0	0.0
137.0	137.0	137.0	0.7	0.0	0.0
138.0	138.0	138.0	0.7	0.0	0.0
139.0	139.0	139.0	0.7	0.0	0.0
140.0	140.0	140.0	0.7	0.0	0.0
89.0	89.0	89.0	0.7	0.0	0.0
84.0	84.0	84.0	0.7	0.0	0.0
79.0	79.0	79.0	0.7	0.0	0.0
74.0	74.0	74.0	0.7	0.0	0.0
69.0	69.0	69.0	0.7	0.0	0.0
64.0	64.0	64.0	0.7	0.0	0.0
59.0	59.0	59.0	0.7	0.0	0.0
54.0	54.0	54.0	0.7	0.0	0.0
49.0	49.0	49.0	0.7	0.0	0.0
44.0	44.0	44.0	0.7	0.0	0.0
39.0	39.0	39.0	0.7	0.0	0.0



Test Data for Sound Level Meter

Page 2 of 5

Sound level meter type:	2250	Serial No.	2718891	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2698651	Report:	17CA0902 02-01
Preamp type:	ZC0032	Serial No.	13278		
34.0	34.0	34.0	0.7	0.0	0.0
33.0	33.0	33.0	0.7	0.0	0.0
32.0	32.1	32.1	0.7	0.1	0.1
31.0	31.1	31.1	0.7	0.1	0.1
30.0	30.2	30.2	0.7	0.2	0.2

Measurements for an indication of the reference SPL on all other ranges which include it

Other ranges	Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	94.0	94.0	0.7	0.0

Measurements on all level ranges for indications 2 dB below the upper limit and 2 dB above the lower limit

Ranges	Reference/Expected level	Actual level	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
20-140	30.0	30.1	0.7	0.1
	138.0	138.0	0.7	0.0

FREQUENCY WEIGHTING TEST

The frequency response of the weighting networks are tested at octave intervals over the frequency ranges 31.5 Hz to 12500 Hz. The signal level at 1000 Hz is set to give an indication of the reference SPL.

Frequency weighting A:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
					+	-	
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	54.6	0.0	54.6	1.5	1.5	0.0
63.1	94.0	67.8	0.0	67.8	1.5	1.5	0.0
125.9	94.0	77.9	0.0	77.9	1.0	1.0	0.0
251.2	94.0	85.4	0.0	85.4	1.0	1.0	0.0
501.2	94.0	90.8	0.0	90.8	1.0	1.0	0.0
1995.0	94.0	95.2	0.0	95.2	1.0	1.0	0.0
3981.0	94.0	95.0	-0.1	94.9	1.0	1.0	0.0
7943.0	94.0	92.9	-0.3	92.6	1.5	3.0	0.0
12590.0	94.0	89.7	-0.3	89.4	3.0	6.0	0.0

Frequency weighting C:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
					+	-	
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	91.0	0.0	91.1	1.5	1.5	0.1
63.1	94.0	93.2	0.0	93.2	1.5	1.5	0.0
125.9	94.0	93.8	0.0	93.8	1.0	1.0	0.0



Test Data for Sound Level Meter

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Sound level meter type:	2250	Serial No.	2718891	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2698651		
Preamp type:	ZC0032	Serial No.	13278	Report:	17CA0902 02-01
251.2	94.0	94.0	0.0	94.0	1.0 1.0 0.0
501.2	94.0	94.0	0.0	94.0	1.0 1.0 0.0
1995.0	94.0	93.8	0.0	93.8	1.0 1.0 0.0
3981.0	94.0	93.2	-0.1	93.1	1.0 1.0 0.0
7943.0	94.0	91.0	-0.3	90.7	1.5 3.0 0.0
12590.0	94.0	87.8	-0.3	87.4	3.0 6.0 -0.1

Frequency weighting Lin:

Frequency	Ref. level	Expected level	Correction of electrical response	Actual level	Tolerance(dB)		Deviation *
					+	-	
Hz	dB	dB	dB	dB	+	-	dB
1000.0	94.0	94.0	0.0	94.0	0.0	0.0	0.0
31.6	94.0	94.0	0.0	94.1	1.5	1.5	0.1
63.1	94.0	94.0	0.0	94.0	1.5	1.5	0.0
125.9	94.0	94.0	0.0	94.0	1.0	1.0	0.0
251.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
501.2	94.0	94.0	0.0	94.0	1.0	1.0	0.0
1995.0	94.0	94.0	0.0	94.0	1.0	1.0	0.0
3981.0	94.0	94.0	-0.1	93.9	1.0	1.0	0.0
7943.0	94.0	94.0	-0.3	93.7	1.5	3.0	0.0
12590.0	94.0	94.0	-0.3	93.7	3.0	6.0	0.0

*Deviation = Actual level - (Expected level + Correction of electrical response)

The correction of electrical response is specified in the Table A.2 of technical documentation of BE 1712-21. The maximum expanded uncertainty of correction of electrical response is 0.29 dB.

TIME WEIGHTING FAST TEST

Time weighting F is tested on the reference range with a single sinusoidal burst of duration 200 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
			+	-	
dB	dB	dB	+	-	dB
116.0	115.0	115.0	1.0	1.0	0.0

TIME WEIGHTING SLOW TEST

Time weighting S is tested on the reference range with a single sinusoidal burst of duration 500 ms at a frequency 2000 Hz and an amplitude which produces an indication 4 dB below the upper limit of the primary indicator range when the signal is continuous. (Weight A, Maximum hold)

Ref. level	Expected level	Actual level	Tolerance(dB)		Deviation
			+	-	
dB	dB	dB	+	-	dB
116.0	111.9	111.9	1.0	1.0	0.0

PEAK RESPONSE TEST

The onset time of the peak detector is tested on the reference range by comparing the response to a 100 us rectangular test pulse with the response to a 10 ms reference pulse of the same amplitude. The amplitude of the



Test Data for Sound Level Meter

Page 4 of 5

Sound level meter type:	2250	Serial No.	2718891	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2698651		
Preamp type:	ZC0032	Serial No.	13278	Report:	17CA0902 02-01

10 ms reference pulse is such as to produce an indication 1 dB below the upper limit of the primary indicator range.

Positive polarities: (Weighting Z, set the generator signal to single, LZPeak)

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.3	2.0	0.3

Negative polarities:

Ref. level	Response to 10 ms	Response to 100 us	Tolerance	Deviation
dB	dB	dB	+/- dB	dB
119.0	119.0	119.4	2.0	0.4

RMS ACCURACY TEST

The RMS detector accuracy is tested on the reference range for a crest factor of 3.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz. (Set to INT)

	Ref. Level	Expected level	Tone burst signal	Tolerance	Deviation
Time weighting	dB	dB	indication(dB)	+/- dB	dB
Slow	118.0+6.6	118.0	118.0	0.5	0.0

TIME WEIGHTING IMPULSE TEST

Time weighting I is tested on the reference range (Set the SLM to LAImax)

Test frequency: 2000 Hz
Amplitude: The upper limit of the primary indicator range.

Single sinusoidal burst of duration 5 ms:

Ref. Level	Single burst indication		Tolerance	Deviation
	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	111.2	111.1	2.0	-0.1

Repeated at 100 Hz

Ref. Level	Repeated burst indication		Tolerance	Deviation
	Expected (dB)	Actual (dB)	+/- dB	dB
120.0	117.3	117.3	1.0	0.0

TIME AVERAGING TEST

This test compares the SLM reading for continuous sine signals with readings obtained from a sine tone burst sequence having the same RMS level. The test level is 30 dB below the upper limit of the linearity range and repeated for Type 1 SLM with 40 dB below the upper limit of the linearity.

Frequency of tone burst: 4000 Hz

Duration of tone burst: 1 ms

Repetition Time	Level of tone burst	Expected Leq	Actual Leq	Tolerance	Deviation	Remarks
msec	dB	dB	dB	+/- dB	dB	
1000	110.0	110.0	109.9	1.0	-0.1	60s integ.
10000	100.0	100.0	100.0	1.0	0.0	6min. integ.



Test Data for Sound Level Meter

Page 5 of 5

Sound level meter type:	2250	Serial No.	2718891	Date	09-Sep-2017
Microphone type:	4950	Serial No.	2698651		
Preamp type:	ZC0032	Serial No.	13278	Report:	17CA0902 02-01

PULSE RANGE AND SOUND EXPOSURE LEVEL TEST

The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range

Test frequency: 4000 Hz
Integration time: 10 sec

The integrating sound level meter set to Leq:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10	88.0	58.0	58.0	1.7	0.0

The integrating sound level meter set to SEL:

Duration	Rms level of	Expected	Actual	Tolerance	Deviation
msec	tone burst (dB)	dB	dB	+/- dB	dB
10.0	88.0	68.0	68.0	1.7	0.0

OVERLOAD INDICATION TEST

For SLM capable of operating in a non-integrating mode.

Test frequency: 2000 Hz
Amplitude: 2 dB below the upper limit of the primary indicator range.
Burst repetition frequency: 40 Hz
Tone burst signal: 11 cycles of a sine wave of frequency 2000 Hz.

Level	Level reduced by	Further reduced	Difference	Tolerance	Deviation
at overload (dB)	1 dB	3 dB	dB	dB	dB
137.4	136.4	133.4	3.0	1.0	0.0

For integrating SLM, with the instrument indicating Leq.

For integrating SLM, with the instrument indicating Leq and set to the reference range. The test signal as follow
The test tone burst signal is superimposed on a baseline signal corresponding to the lower limit of reference range
Test frequency: 4000 Hz
Integration time: 10 sec
Single burst duration: 1 msec

Rms level	Level reduced by	Expected level	Actual level	Tolerance	Deviation
at overload (dB)	1 dB	dB	dB	dB	dB
144.1	143.1	103.1	103.1	2.2	0.0

ACOUSTIC TEST

The acoustic test of the complete SLM is tested at the frequency 125 Hz and 8000 Hz using a B&K type 4226 Multifunction Acoustic Calibrator. The test is performed in A weighting.

Frequency	Expected level	Actual level	Tolerance (dB)		Deviation
			+	-	
Hz	dB	Measured (dB)			dB
1000	94.0	94.0	0.0	0.0	0.0
125	77.9	78.0	1.0	1.0	0.1
8000	92.9	90.7	1.5	3.0	-2.2

-----END-----