

MTR Corporation Limited

ROAD WORKS at WEST KOWLOON

(No. EP-366/2009/A)

Environmental Monitoring and Audit Report No. 31

(January 2014)


Verified by :   
Position : Independent Environmental Checker  
Date : 14 February 2014

MTR Corporation Limited

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(No. EP-366/2009/A)

Environmental Monitoring and Audit Report No. 31  
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Certified by :   
Position : Environmental Team Leader  
Date : 14 February 2014



# ROADWORKS AT WEST KOWLOON



Environmental Monitoring and Audit Report No. 31  
January 2014

## **EXECUTIVE SUMMARY**

This is the 31<sup>st</sup> monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works undertaken during the period from 1 to 31 January 2014 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 four (4) noise monitoring locations in the vicinity of Works Area in West Kowloon in the interval of once every week.

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, 810B 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 are detailed in Section 6.

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

For the reporting month, there was one environmental complaint referred from EPD. The complaint was related to the muddy water from construction site at Austin Road West which affected the nearby road users. Complaint investigations were conducted in accordance with the complaint handling procedure in the EM&A

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Manual and the details of complaints were contained in Section 7.

For the reporting month, no record of exceedance of air-borne noise Limit Levels and no record of exceedance of Action Levels triggered due to noise complaint received regarding the daytime working hours in the reporting month.

No exceedances of 24-hour TSP Action and Limit Level were recorded during 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, 810B and 811B.

#### ***Works for Coming Month***

The construction works were continued in the reporting month of January 2014 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;
- Site water discharge; and
- Chemical wastes.

#### ***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 31<sup>st</sup> monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works undertaken during the period from 1 to 31 January 2014 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 31<sup>st</sup> month of civil construction in Works Area in West Kowloon for January 2014. It is anticipated that the civil construction be completed in year 2014. The updated construction activity is provided in Section 8. Major construction activities undertaken in the reporting month is summarized in the following table.

<b>Contract</b>	<b>Major Construction Activities</b>
810A	Pre-boring of sheetpile; Removal of abandon foul sewer; Trial trench and pre-drilling for bore pile; Bore pile; H pile installation and grouting; Sheet pile installation; Excavation; Strut installation to GC culvert and Pre-drilling
810B	Bore piling, Sheet piling, Drainage work and Road diversion
811B	Pipe jacking excavation for sewer diversion from manhole no. MH P9B and Pipe installation for sewer diversion from manhole no. MH P9B to P8A

**Table 2-1** Major construction activities in January 2014

### 3. ENVIRONMENTAL STATUS

#### 3.1 *Status of Implementation of mitigation measures*

Environmental mitigation measures recommended in the EIA report were implemented and their implementation status is summarized in Appendix C.

#### 3.2 *Status of Submissions under EP*

A summary of the submissions submitted under the EP for this Project as at 31 January 2014 is presented in Table 3-1 below:

<b>EP-366/2009/A Clause No.</b>	<b>Document Title</b>	<b>Status</b>
3.4	Monthly Environmental Monitoring and Audit Report (December 2013)	Submitted on 14 January 2014.

**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 Road Works under the XRL project.

Item	Item Description	Application Date	Permit Status
<b>Contract 810A</b>			
1	Construction Noise Permit (General Works)	24 Dec 2013	Granted on 7 Jan 2014 Permit No. GW-RE0012-14, valid from 11 Jan 2014 to 1 Jul 2014
2	Construction Noise Permit (General Works)	24 Dec 2013	Granted on 7 Jan 2014 Permit No. GW-RE0013-14, valid from 18 Jan 2014 to 18 Mar 2014
3	Construction Noise Permit (General Works)	2 Dec 2013	Granted on 12 Dec 2013 Permit No. GW-RE1359-13, valid from 17 Dec 2013 to 21 Dec 2013
<b>Contract 810B</b>			
1	Construction Noise Permit (General Works)	20 Dec 2013	Granted on 3 Jan 2014 Permit No. GW-RE0004-14, valid from 8 Jan 2014 to 7 Jul 2014
2	Dumping Permit for Type 2 marine sediment	27 Dec 2013	Granted on 15 Jan 2014 Permit No. EP/MD/14-118, valid period - 18 Jan 2014 to 17 Feb 2014
3	Dumping Permit for Type 1 marine sediment	2 Dec 2013	Granted on 19 Dec 2013 Permit No. EP/MD/14-112, valid period - 28 Dec 2013 to 27 Jun 2014
<b>Contract 811B</b>			
No updates in the reporting month			

**Table 3-2** Summary of the status of permits, licences and notifications made, applied and approved under this Project during the previous and 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
CAM-1	Podium between Sorrento and The Waterfront	515	28 Oct 2013
CAM-2	Podium next to Tower 3, The Waterfront	1282	28 Oct 2013
CAM-3	Roof of Lift Building, The Victoria Towers	528	28 Oct 2013

**Table 4-1** Calibration details of HVS

#### 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.

Immediately prior to and following each noise measurement the accuracy of the sound level meter should be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the difference between calibration levels obtained before and after the noise measurement is less than 1.0 dB.

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 4-4 and Appendix H.

Monitoring Station ID	Noise Monitoring Location	Serial Number	Last Calibration Date <sup>[1]</sup>
<i>Sound Level Meters</i>			
CNM-1	Man Cheong Street Refuse Station	2701816	9 January 2014
CNM-2	Tower 6, Sorrento	2701826	28 January 2014
CNM-3	Podium next to Tower 3, The Waterfront	2701823	19 December 2013
CNM-4	Tower 2, The Harbour Side	2701886	27 May 2013
<i>Calibrator</i>			
<b>Serial Number</b>		<b>Last Calibration Date</b>	
N674902		26 October 2013	

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

**Table 4-4** Calibration details of noise monitoring equipments

#### 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 4-4 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 4-5 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 4-5** Action and Limit Levels for Air-borne Construction Noise

## **5. MONITORING RESULT**

### **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 of 24-hr TSP Action and Limit Level were recorded. Actions stipulated under the Event and Action Plan (Table 3.3 of the EM&A Manual) was implemented for all exceedances and monitoring frequency would be increased if exceedance was 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 of air-borne noise Limit Level was recorded. Action stipulated under the Event and Action Plan (Table 2.3 of the EM&A Manual) was undertaken if exceedance was recorded.

Apart from the above, no air-borne noise exceedance of Action Levels was recorded due to noise complaints in daytime working hours received in the reporting month.

### **5.3 *Waste Management***

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

Reporting Month	Inert C&D <sup>[1]</sup> Materials (tonnes)	Non-inert C&D <sup>[2]</sup> Materials (tonnes)	Chemical Waste	
			(litre)	(kg)
<b>Contract 810A</b> <sup>[3]</sup>				
November 2013	20.3	0	0	0
December 2013	67.8	0	0	0
January 2014	17.7	0	0	0
<b>Contract 810B</b> <sup>[4]</sup>				
November 2013	237.0	50.7	0	0
December 2013	1,282.0	75.4	0	0
January 2014	565	61.9	0	0
<b>Contract 811B</b> <sup>[5]</sup>				
November 2013	0	0	0	0
December 2013	266	0	0	0
January 2014	0	0	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.
- [3]. Alternative disposal sites for inert C&D material from 810A include WENT Landfill.
- [4]. Alternative disposal sites for inert C&D material from 810B include Central-Wan Chai Bypass (Typhoon Shelter and HKCEC) and Zhongshan Torch Hi-Tech Zone.
- [5]. Alternative disposal sites for inert C&D material from Contract 811B include Central-Wan Chai Bypass, Contract HK12/02 CRIII, Lim Wan EPD Sludge Treatment Plant (EP/SP/58/08) and Zhongshan Torch Hi-Tech Zone.

## 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, 810B 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 22 January 2014 in 810A, 8 January 2014 in 810B and 22 January 2014 in 811B.

<b>Contract</b>	<b>Date of Site Inspections</b>
810A	2/1, 8/1, 16/1, 22/1 and 30/1
810B	2/1, 8/1, 15/1, 22/1 and 29/1
811B	2/1, 10/1, 15/1, 22/1 and 29/1

**Table 6-1** Date of site inspections in January 2014

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.

<b>Item</b>	<b>Description</b>	<b>Contractor's Follow-up Action(s) Undertaken</b>
<b>Contract 810A</b>		
1	Dark smoke was observed emitting from the air compressor used at the works area near Wui Man Road	The concerned air compressor has been replaced by another one in the following day of the inspection.

Item	Description	Contractor's Follow-up Action(s) Undertaken
<b>Contract 810B</b>		
1	The noise label was found missing at the air compressor placed at the works area at Austin Road West (W).	The supplier has been required to provide the noise label and posted again at the air compressor.
<b>Contract 811B</b>		
1	Grouting station was being established without sufficient covering at the works area near the west of Lin Cheung Road.	The grouting station has been properly covered on 3 sides and top during the operation and has been removed two days after the inspection since the grouting work has been completed.

**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 one environmental complaint referred from EPD. There were a total of twenty-five (25) environmental complaints counted since the commencement of the construction. The complaints were handled in accordance to the EM&A Manual and relevant parties including the Engineer's Representative and IEC. Details of the complaints were summarized in the following paragraph.

A complaint was referred from EPD on 23 January 2014 regarding muddy surface water from construction site at Austin Road West which affected the nearby road users. The complaint handling procedures in accordance with the EM&A Manual have been undertaken. Investigation showed that no abnormal operation was found on site. Nonetheless, the Contractors were reminded to maintain controls and mitigation measures as far as enough to minimize the impact to the surrounding environment.

Apart from the above, the Contractors were reminded to ensure that the legal requirements were complied with. 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 air-borne noise Limit Level was recorded. Actions stipulated under the Event and Action Plan (Table 2.3 of the EM&A Manual) would be undertaken for exceedance if applicable.

Apart from the above, no air-borne noise exceedance of Action Level was recorded in the reporting month due to noise complaint received regarding the daytime working hours.

No exceedance of 24-hr TSP Action and Limit Level were recorded in the reporting month. Actions stipulated under the Event and Action Plan (Table 3.3 of the EM&A Manual) would be implemented for the exceedance and

monitoring frequency would be increased if applicable.

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

No notification of environmental warnings from EPD, no summons, no non-compliance and no prosecutions was received related to the Roadworks by MTRCL and the Contractors of 810A, 810B 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.

<b>Contract</b>	<b>Major Construction Activities</b>
810A	Construction of gas main; Trial trench or pit along sheet pile wall; H pile installation and grouting; Pre-drilling; Slab formation; Bore piling; Pre-boring of sheetpile and Sheet pile installation
810B	Bore piling; Sheet piling; Drainage work and Road diversion
811B	Pipe jacking excavation for sewer diversion from manhole no. MH P9B and Pipe installation for sewer diversion from MH P9B to P8A

**Table 8-1** Summary of construction works in the coming month (i.e. February 2014)

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 *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 31 January 2014. The major construction activities in the reporting period included foundation works in the West Kowloon Works Areas.

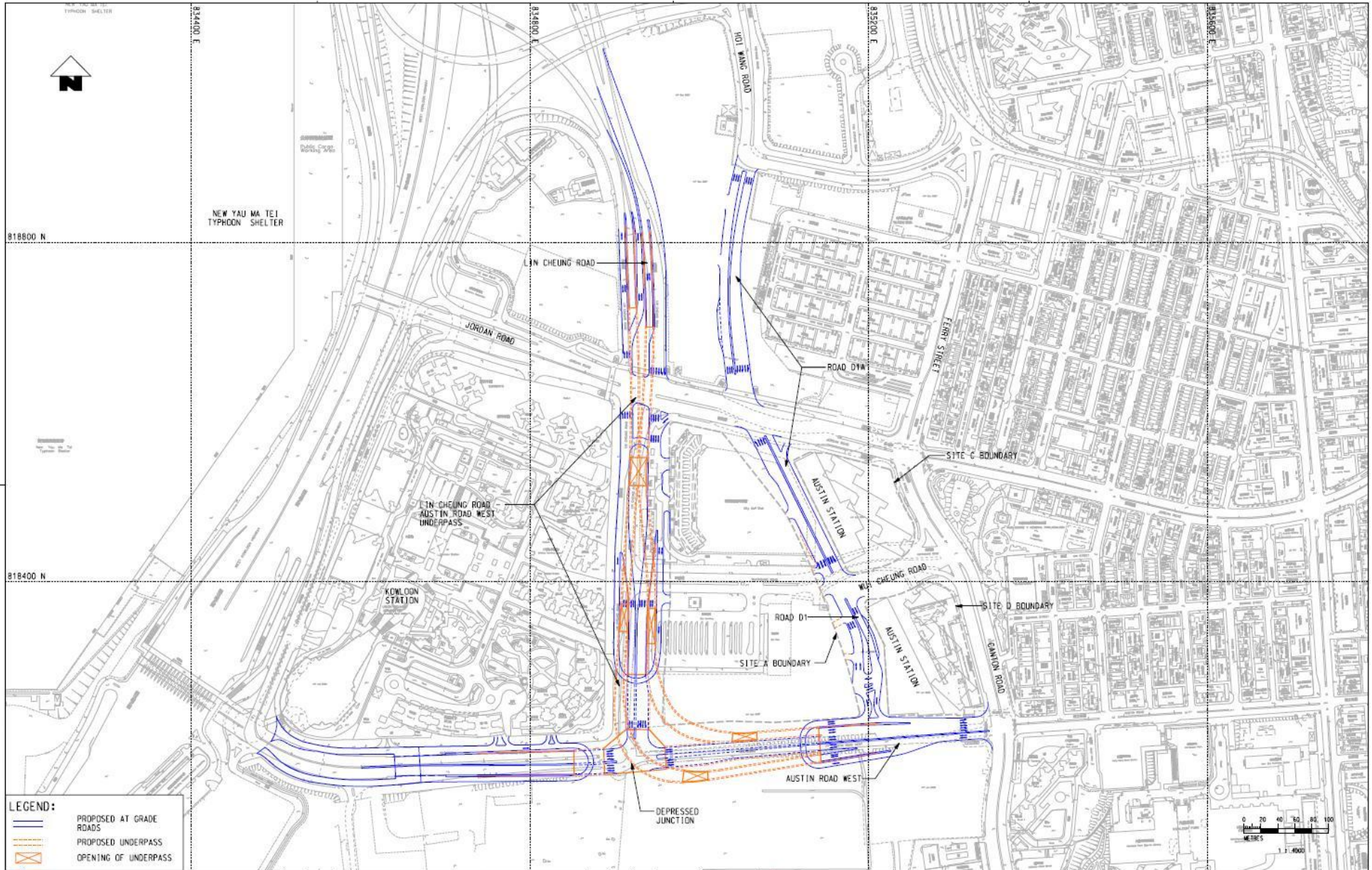
Impact monitoring for air quality and air-borne noise were conducted in accordance with the EM&A Manual in the reporting period. No exceedance of Limit Levels in air-borne noise was recorded in the reporting month. No exceedance of Action Levels in air-borne noise due to noise complaint received regarding the daytime working hours. Besides, no exceedance of 24-hour TSP Action and Limit Levels were recorded in the reporting month.

For the reporting month, one environmental complaint was referred from EPD. The complaint received was related to muddy surface water from construction site at Austin Road West which affected the nearby road users. The complaints had been handled in accordance with the procedures stipulated and investigations were carried out in accordance with the EM&A Manual. Apart from that, no warning, no summons, no prosecutions and no non-compliance 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



<b>LEGEND:</b> PROPOSED AT GRADE ROADS PROPOSED UNDERPASS OPENING OF UNDERPASS		DRAWN YJP DESIGNED TNF CHECKED KCC APPROVED PL DATE 11/MAR./2009		<b>MTR</b> <b>ROAD WORKS AT WEST KOWLOON</b> PROJECT DIVISION		TITLE <b>PROPOSED ROAD WORKS AT WEST KOWLOON</b>						
REV	DESCRIPTION	BY	DATE	APPROVED	REV	DESCRIPTION	BY	DATE	APPROVED	SCALE	FIGURE NO.	REV.
										1 : 4000 (A3)	NOL/ERL/300/C/WKT/ENS/M62/001	A

WORKS AREA for ROAD WORKS

## Appendix B

# Project Management Organization and Contacts of Key Personnel



<b>Title</b>	<b>Name</b>	<b>Telephone</b>
<b>Engineer's Representative</b>		
Construction Manager (Contract 810A)	Mr. Stephen BOREMAN	2926 9170
Construction Manager (Contract 810B)	Mr. KS LIM	2926 9098
Construction Manager (Contract 810A/811B)	Mr. Albert LAM	2164 2988
<b>Independent Environmental Checker</b>		
Divisional Manager	Dr. Anne KERR	2828 5793
<b>Environmental Team</b>		
Environmental Team Leader	Mr. Richard KWAN	2688 1179
<b>Contractors</b>		
<b><i>Contract 810A</i></b>		
Principle Project Director	Mr. Dale WALTON	3759 9810
Senior Environmental Officer	Mr. Dominic FUNG	3759 9796
Environmental Officer	Mr. Calvin SO	3759 9793
Environmental Officer	Ms. Shirley LUI	3759 9791
<b><i>Contract 810B</i></b>		
Project Director	Mr. Smollett LEE	2472 8080
Environmental Manger	Mr. Calvin SZE	2472 9509
Environmental Officer	Ms. Julie CHEN	2472 9510
<b><i>Contract 811B</i></b>		
Project Manager	Mr. Chris WILLIAMS	2269 1518
Project Quality and Environmental Manager	Mr. Michael Leney	2269 1505
Environmental Officer	Ms. Sammie CHAN	2269 1507

# Appendix C

## Implementation Status

**Appendix C 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
<b>Noise Control</b>					
3.53 – 3.54	<p>The following quiet PME should be used:</p> <ul style="list-style-type: none"> <li>• Pneumatic breaker (SWL=110dB(A))</li> <li>• Tracked Excavator Fitted with Hydraulic Breaker (SWL=110dB(A))</li> <li>• Truck Mixer (SWL=100dB(A))</li> <li>• Tracked Crane (SWL=101dB(A))</li> <li>• Dump Truck (SWL=103dB(A))</li> <li>• Tracked Excavator/Loader (SWL=105dB(A))</li> <li>• Dozer (SWL=111dB(A))</li> <li>• Road Roller (SWL=101dB(A))</li> </ul>	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.

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"> <li>• Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction program;</li> <li>• Silencers or mufflers on construction equipment should be utilized and should be properly maintained during the construction programme;</li> <li>• Mobile plant, if any, should be sited as far from noise sensitive receivers (NSRs) as possible;</li> <li>• 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;</li> <li>• 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</li> <li>• Material stockpiles and other structures should be effectively utilized, wherever practicable, in</li> </ul>	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.
<b>Air Quality Control</b>					
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"> <li>• Skip hoist for material transport should be totally enclosed by impervious sheeting.</li> <li>• Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction site.</li> <li>• 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.</li> </ul>	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"> <li>• 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.</li> <li>• 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.</li> <li>• All dusty materials should be sprayed with water prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.</li> <li>• 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.</li> <li>• The load of dusty materials carried by vehicle leaving a construction site should be covered entirely by clean impervious sheeting to</li> </ul>	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"> <li>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.</li> </ul>	To reduce the construction air-borne noise impact.	Contractor	Throughout the whole construction phase	Implemented.
<b>Water Quality Control</b>					
5.30 -5.42	<p>General Construction Activities and Construction site run-off::</p> <ul style="list-style-type: none"> <li>The mitigation measures as outlined in the ProPECC PN 1/94 Construction Site Drainage should be adopted where applicable.</li> </ul>	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"> <li>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</li> </ul>	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"> <li>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.</li> </ul>	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"> <li>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.</li> <li>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.</li> <li>Disposal of chemical wastes should be carried out in compliance with the Waste Disposal Ordinance.</li> </ul>	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"> <li>➤ Suitable containers should be used to hold the chemical wastes to avoid leakage or spillage during storage, handling and transport.</li> <li>➤ Chemical waste containers should be suitably labelled, to notify and warn the personnel who are handling the wastes, to avoid accidents.</li> <li>➤ Storage area should be selected at a safe location on site and adequate space should be allocated to the storage area.</li> </ul>	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"> <li>• Sufficient chemical toilets should be provided in the works areas. A licensed</li> </ul>	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"> <li>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.</li> </ul>	To control water quality impact from construction site runoff and general construction activities.	Contractor	Throughout the whole construction phase	Implemented.
<b>Waste Management</b>					
6.47	<p>All waste materials should be segregated into categories covering:</p> <ul style="list-style-type: none"> <li>Excavated materials suitable for reuse;</li> <li>Inert C&amp;D materials for disposal off-site;</li> </ul>	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"> <li>• Non-inert C&amp;D materials for disposal at landfills;</li> <li>• Chemical waste; and</li> <li>• General refuse.</li> </ul>	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"> <li>• Training of site personnel in, site cleanliness, proper waste management and chemical handling procedures;</li> <li>• Provision of sufficient waste disposal points and regular collection of waste;</li> <li>• Appropriate measures to minimize windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;</li> <li>• Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors; and</li> <li>• Separation of chemical wastes for special handling and appropriate treatment.</li> </ul>	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"> <li>• Sorting of demolition debris and excavated materials from demolition works to recover reusable/ recyclable portions (i.e. soil, broken concrete, metal etc.);</li> <li>• 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;</li> <li>• 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;</li> <li>• Proper storage and site practices to minimize the potential for damage or contamination of construction materials;</li> <li>• Plan and stock construction materials carefully to minimize amount of waste generated and avoid unnecessary</li> </ul>	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"> <li>• Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedures, including waste reduction, reuse and recycle.</li> </ul>	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.

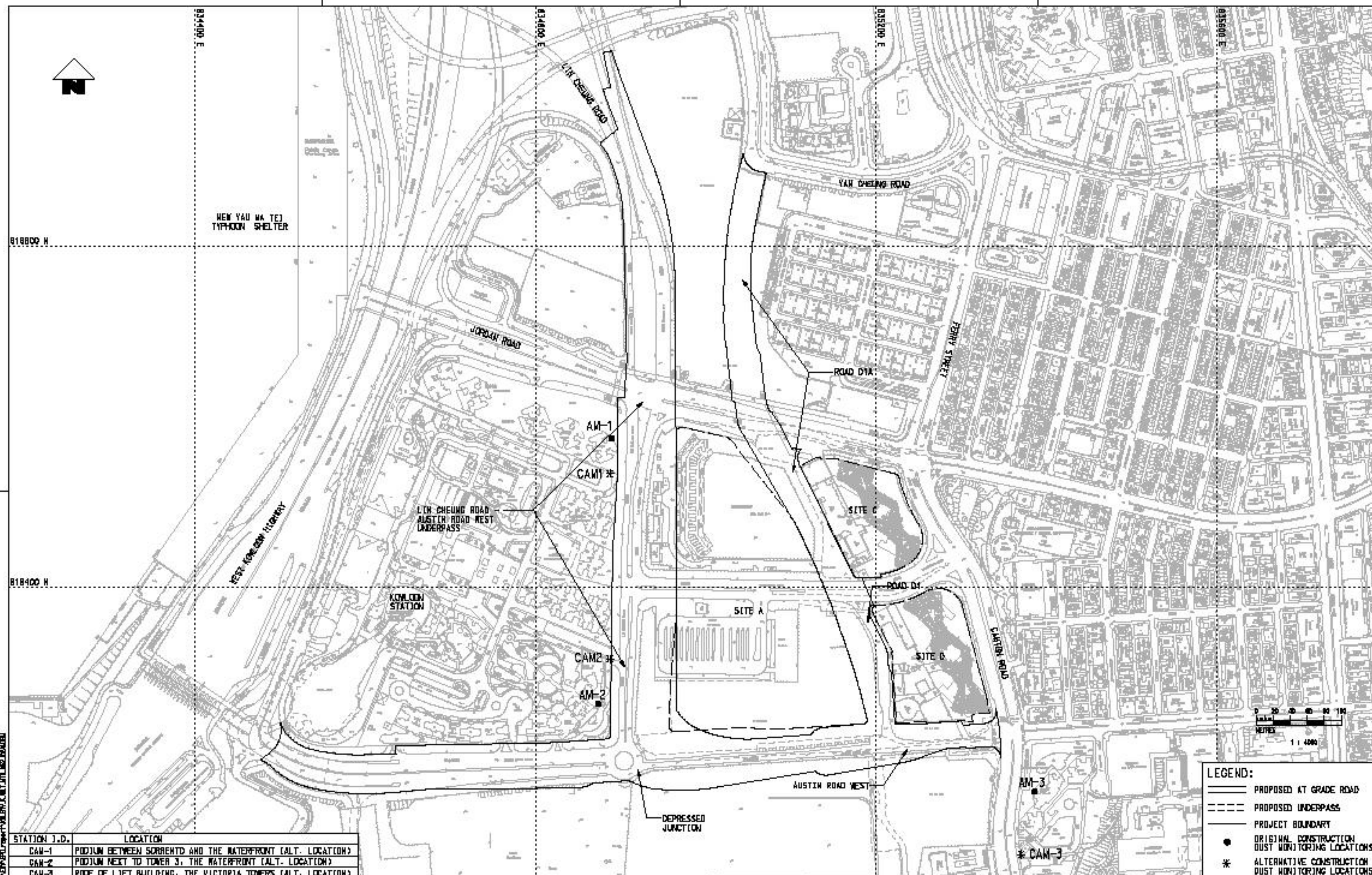


EIA Ref #	Environmental Protection Measures / Mitigation Measures	Objectives of the Recommended Measures & Main Concern to Address	Who to implement the measures?	When to implement the measures?	Implementation Status
6.61	required to register with the EPD as a chemical waste producer and to follow the 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.
<b>Landscaping and Visual Management</b>					
Table 7.4	<ul style="list-style-type: none"> <li>Topsoil, where identified, should be stripped and stored for re-use in the construction of the soft landscape works.</li> </ul>	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"> <li>• Existing trees to be retained on site should be carefully protected during construction.</li> <li>• 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.</li> <li>• Compensatory tree planting provided to compensate for felled trees and maintained until end of the establishment period.</li> <li>• Control of night-time lighting glare</li> <li>• Erection of decorative screen hoarding compatible with the surrounding setting.</li> </ul>	To minimize landscape and visual impacts during construction phase	Contractor	Throughout the whole construction phase	Implemented.

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 LIFT BUILDING, THE VICTORIA TOWERS (ALT. LOCATION)

NO.	DESCRIPTION	BY	DATE	APPROVED BY
A1	FIRST DRAFT			

NO.	DATE	APPROVED BY
18	18/06/11	

DRAWN	YCC
DESIGNED	MC
CHECKED	
APPROVED	
DATE	03/04/2011

**MTR**

**EXPRESS RAIL LINK**

PROJECTS DIVISION | SUSTAINABILITY DEVELOPMENT DEPARTMENT

FILE NO. XRL/ENV/L/WT/MTR/MS2/102A1.DWG

TITLE	SCALE	FRAME NO.	REV
ROADWORKS AT WEST KOWLOON LOCATIONS OF CONSTRUCTION DUST MONITORING STATIONS	1:4000 @ A1	XRL/ENV/K/WT/MTR/MS2/102	A1

1. This drawing is the property of the MTR Corporation Limited. It is to be used only for the project and site for which it is prepared. It is not to be used for any other purpose without the written consent of the MTR Corporation Limited.



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 FILENAME: X:\cadd\_library\mtr\cadd\work\kwsa\plot\dwg\BIM\_300661\_080924.dwg



**LEGEND:**

ID NO.	NOISE MONITORING STATION
CNM - 1	MAN CHEONG STREET REFUSE STATION (ALTERNATIVE LOCATION)
CNM - 2	TOWER 6, SORRENTO
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	REV	DESCRIPTION	BY	DATE	APPROVED
A1	FIRST DRAFT	YCC	05MAY11						

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	<b>ROADWORK AT WEST KOWLOON LOCATION OF CONSTRUCTION NOISE MONITORING STATION</b>	
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 - January 2014

Notes: **TSP** denotes Total Suspended Particulates

24-hr TSP impact monitoring for CAM-2 was suspended from 29-Jan-2014 to 3-Feb-2014 due to power supply shortage

Jan-2014						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2 CNM-1, CNM-2 CNM-3, CNM-4	3 CAM-1, CAM-2, CAM-3	4
5	6	7	8 CNM-2, CNM-3, CNM-4 CAM-1, CAM-2, CAM-3	9	10 CNM-1	11
12	13	14 CNM-2 CAM-1, CAM-2, CAM-3	15 CNM-3, CNM-4	16 CNM-1	17	18
19	20 CNM-2 CAM-1, CAM-2, CAM-3	21	22 CNM-1, CNM-3, CNM-4	23	24	25 CAM-1, CAM-2, CAM-3
26	27	28	29 CNM-2, CNM-4 CAM-1, CAM-3	30 CNM-1, CNM-3	31	



## Tentative Construction Dust (24-hr TSP) and Air-borne Noise Impact Monitoring Schedule - February 2014

Notes: **TSP** denotes Total Suspended Particulates

Feb-2014						
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	4 CAM-1, CAM-2, CAM-3	5 CNM-1, CNM-2 CNM-3, CNM-4	6	7	8 CAM-1, CAM-2, CAM-3
9	10	11	12 CNM-1, CNM-2 CNM-3, CNM-4	13	14 CAM-1, CAM-2, CAM-3	15
16	17	18	19 CNM-1, CNM-2 CNM-3, CNM-4	20 CAM-1, CAM-2, CAM-3	21	22
23	24	25	26 CNM-1, CNM-2 CNM-3, CNM-4 CAM-1, CAM-2, CAM-3	27	28	

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
	( $\mu\text{g}/\text{m}^3$ )	( $\mu\text{g}/\text{m}^3$ )	( $\mu\text{g}/\text{m}^3$ )
03-Jan-14	40.3	168.8	260.0
08-Jan-14	54.5	168.8	260.0
14-Jan-14	56.7	168.8	260.0
20-Jan-14	40.4	168.8	260.0
25-Jan-14	95.2	168.8	260.0
29-Jan-14	23.9	168.8	260.0

### - CAM-2

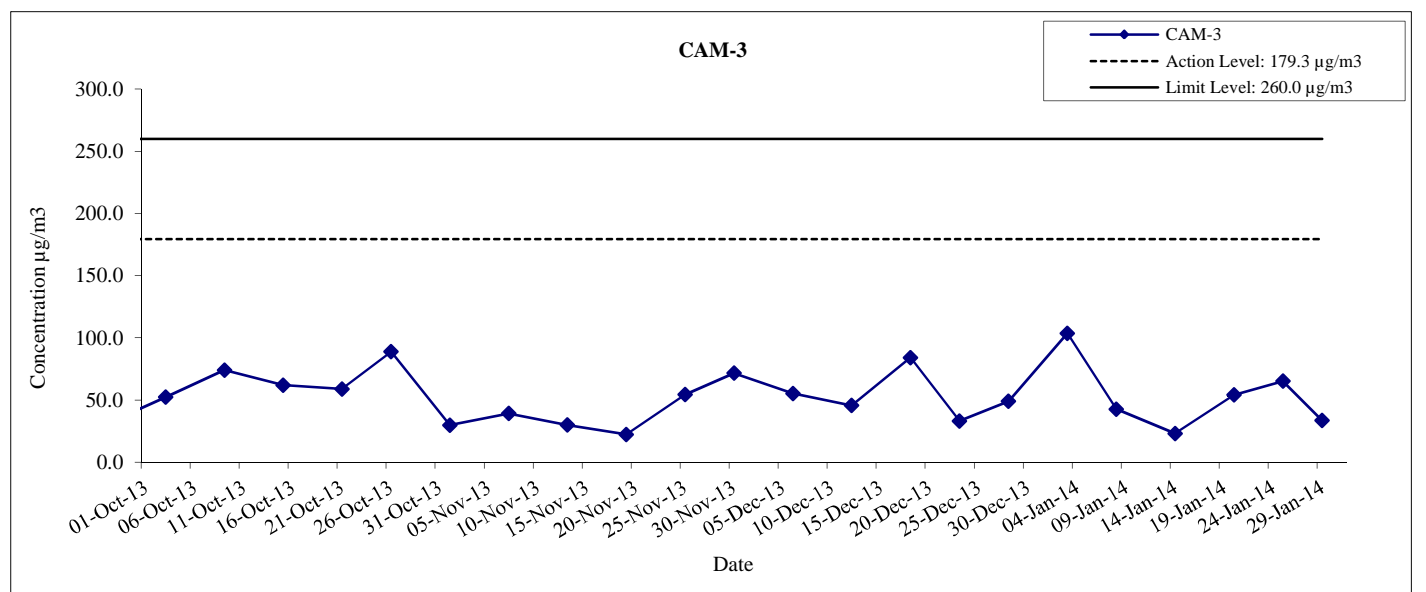
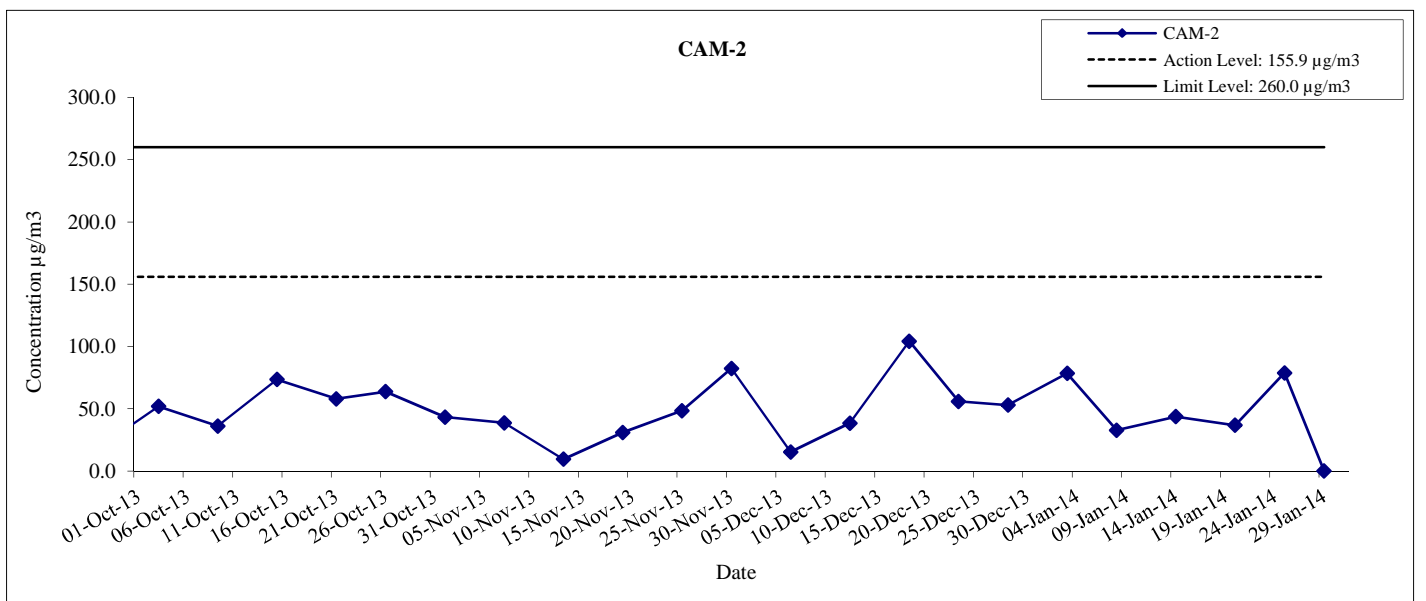
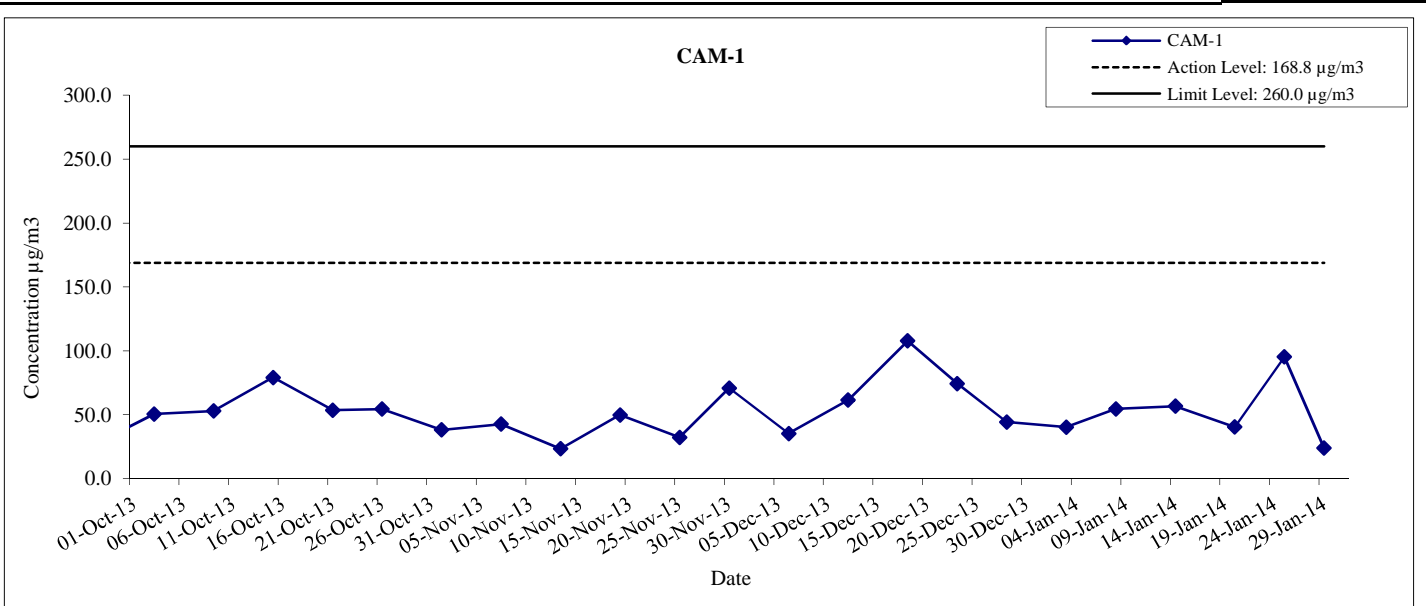
Date	24-hour TSP Monitoring Results	Action Level	Limit Level
	( $\mu\text{g}/\text{m}^3$ )	( $\mu\text{g}/\text{m}^3$ )	( $\mu\text{g}/\text{m}^3$ )
03-Jan-14	78.5	155.9	260.0
08-Jan-14	32.8	155.9	260.0
14-Jan-14	43.7	155.9	260.0
20-Jan-14	36.8	155.9	260.0
25-Jan-14	78.8	155.9	260.0
29-Jan-14	-	155.9	260.0

### - CAM-3

Date	24-hour TSP Monitoring Results	Action Level	Limit Level
	( $\mu\text{g}/\text{m}^3$ )	( $\mu\text{g}/\text{m}^3$ )	( $\mu\text{g}/\text{m}^3$ )
03-Jan-14	103.6	179.3	260.0
08-Jan-14	42.6	179.3	260.0
14-Jan-14	23.1	179.3	260.0
20-Jan-14	54.1	179.3	260.0
25-Jan-14	65.2	179.3	260.0
29-Jan-14	33.5	179.3	260.0

Remark:

1. Bold value indicated an Action level exceedance
2. Bold & Italic value indicated an Limit level exceedance
3. 24-hr TSP impact monitoring for CAM-2 was suspended from 29-Jan-2014 to 3-Feb-2014 due to power supply shortage



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**

**Jan-14**

**APPENDIX**

**F**

## APPENDIX F: Noise Monitoring Results

### - CNM-1

Date	Noise Monitoring Results	Limit Level	Exceedance?
	Leq, dB(A)	Leq, dB(A)	
02-Jan-14	66	75	N
10-Jan-14	67	75	N
16-Jan-14	68	75	N
22-Jan-14	66	75	N
30-Jan-14	64	75	N

### - CNM-2

Date	Noise Monitoring Results	Limit Level	Exceedance?
	Leq, dB(A)	Leq, dB(A)	
02-Jan-14	75	75	N
08-Jan-14	73	75	N
14-Jan-14	73	75	N
20-Jan-14	74	75	N
29-Jan-14	71	75	N

### - CNM-3 <sup>[a]</sup>

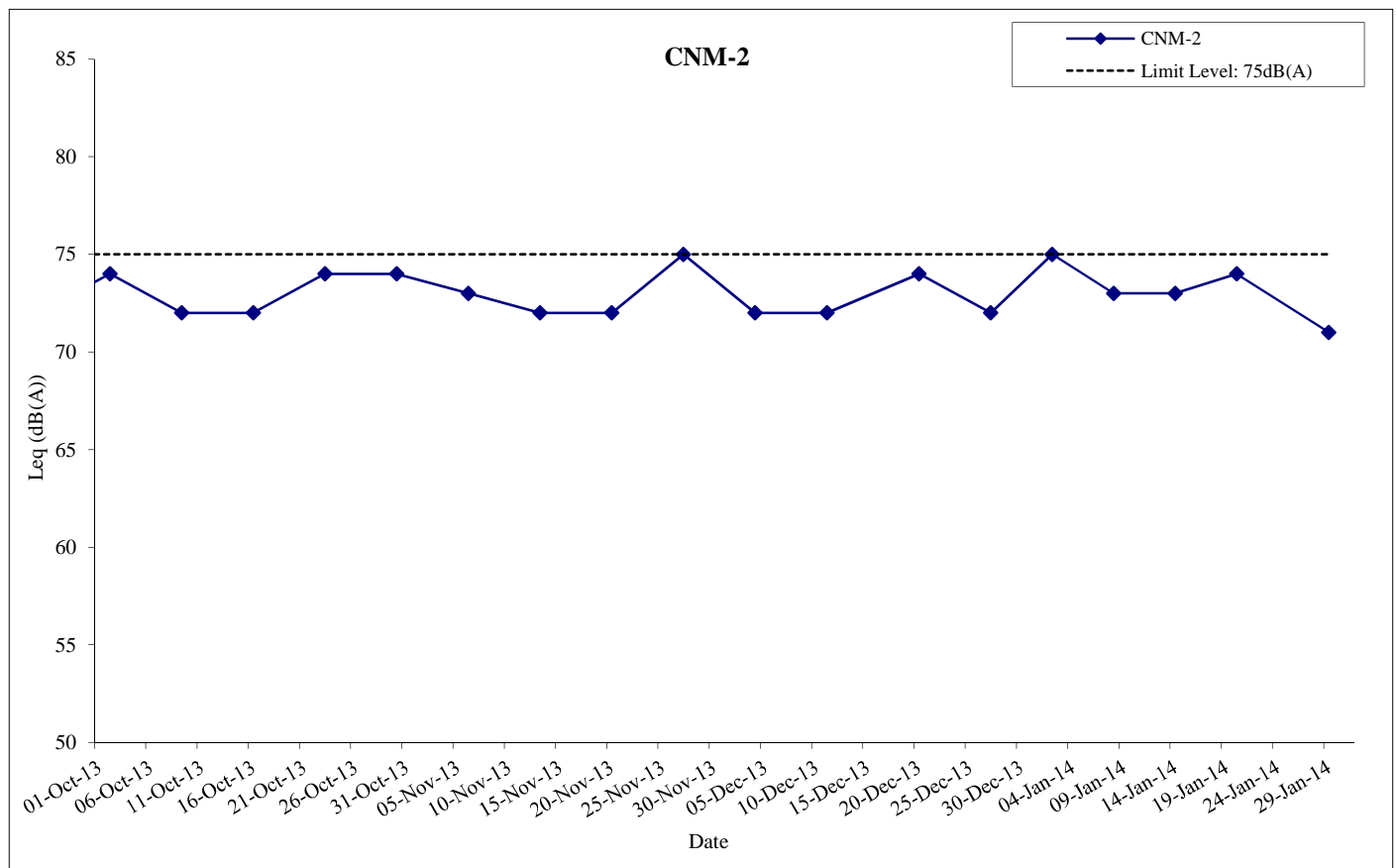
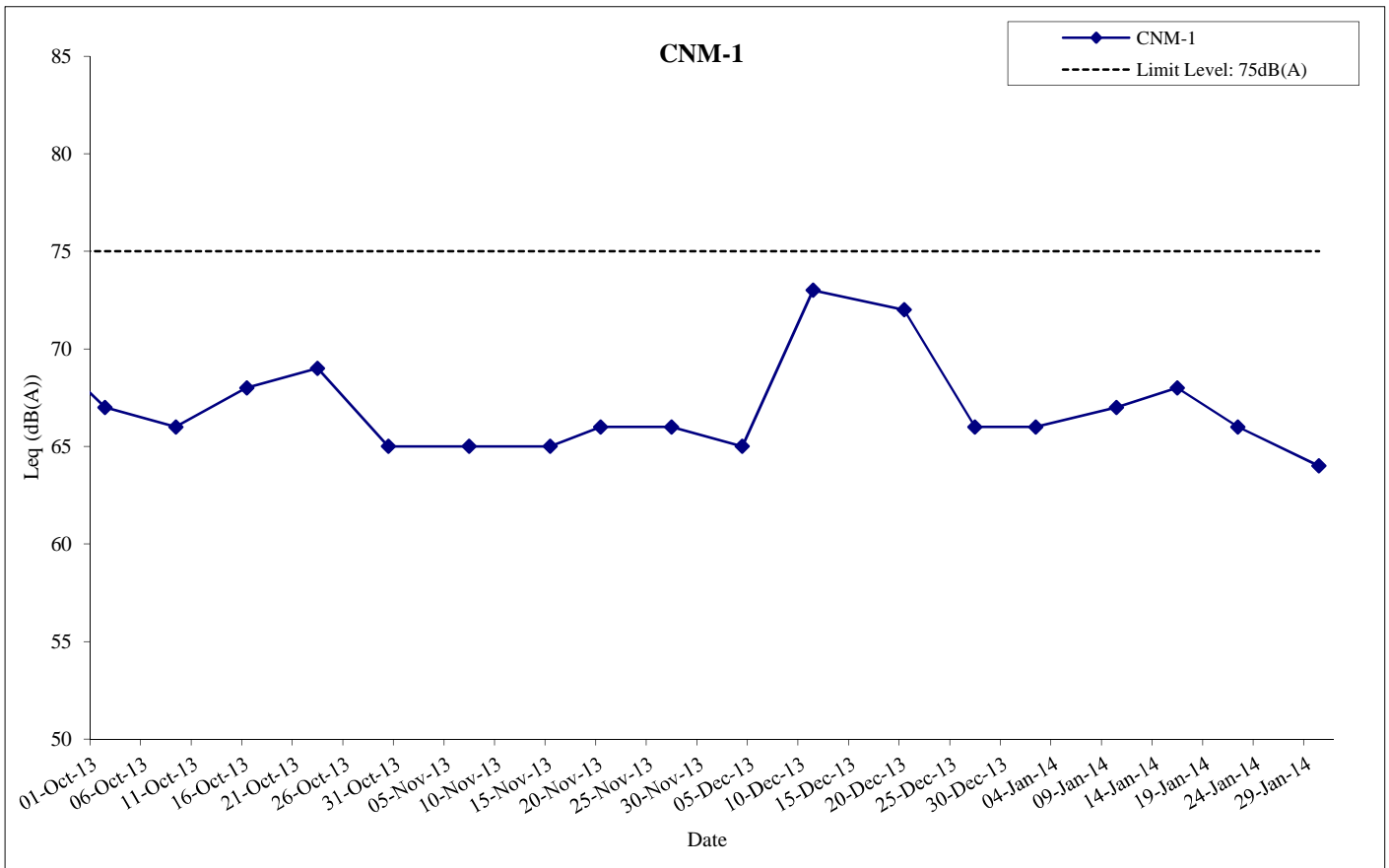
Date	Noise Monitoring Results	Limit Level	Exceedance?
	Leq, dB(A)	Leq, dB(A)	
02-Jan-14	74	75	N
08-Jan-14	74	75	N
15-Jan-14	75	75	N
22-Jan-14	75	75	N
30-Jan-14	67	75	N

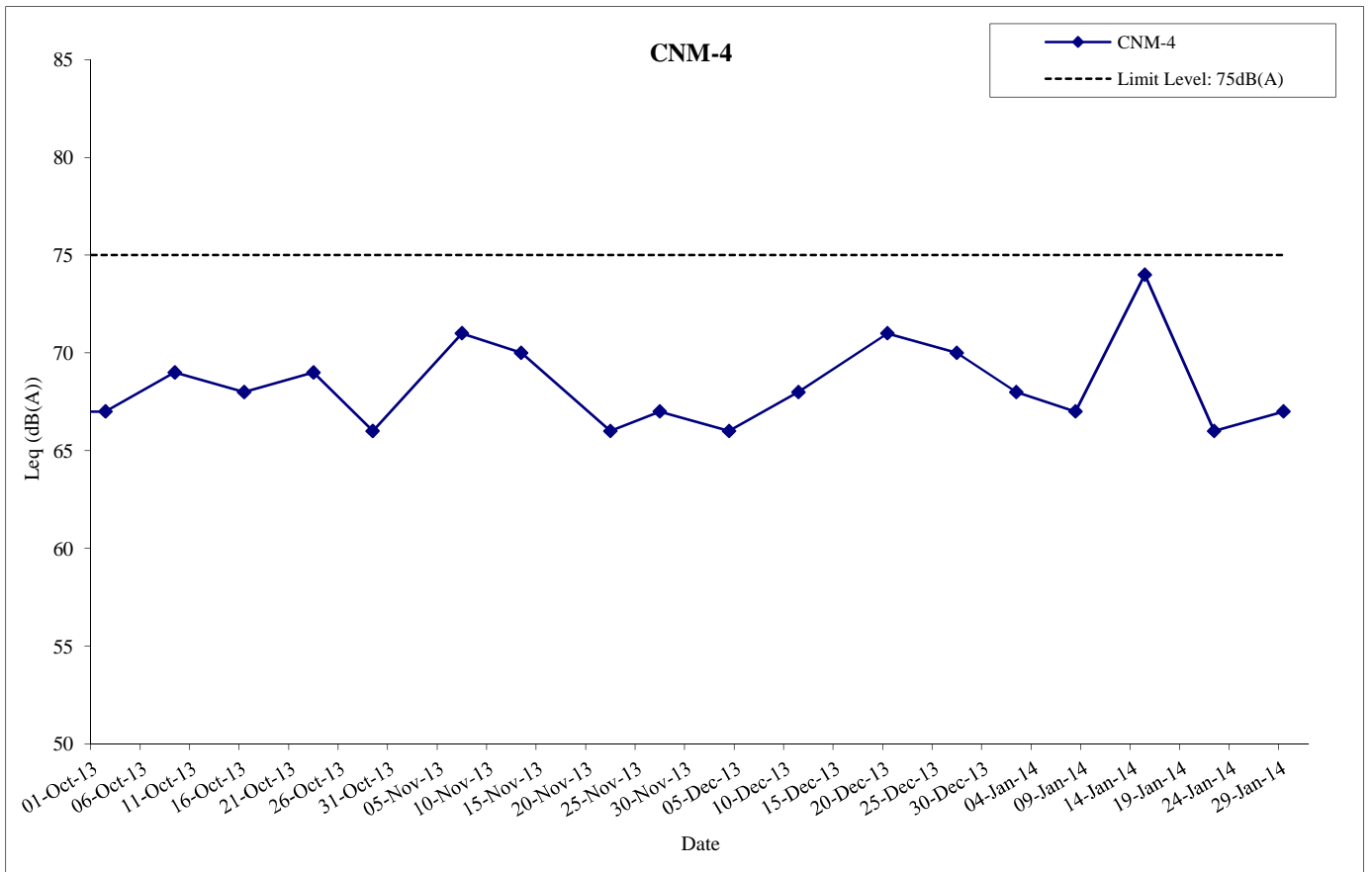
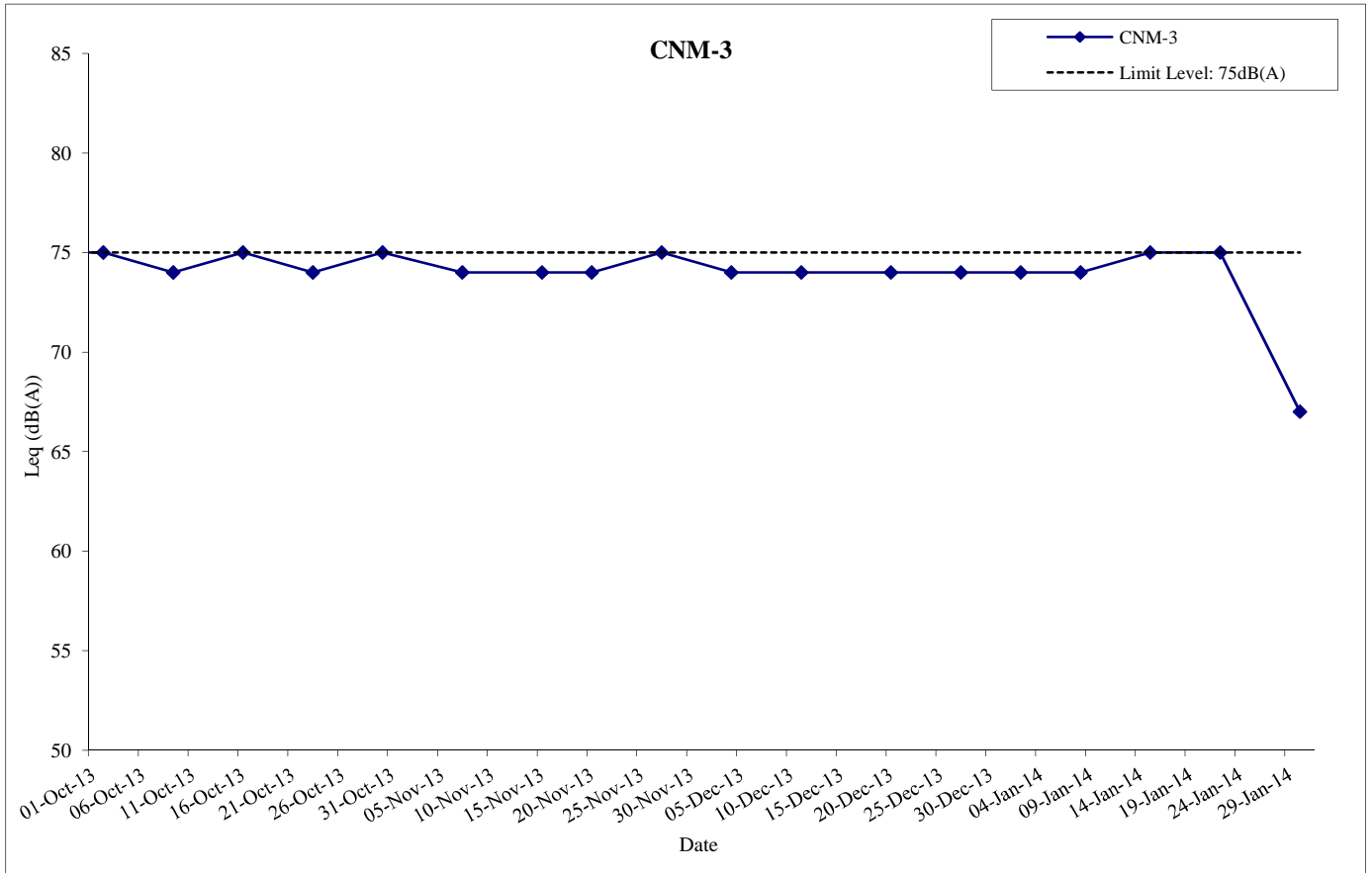
### - CNM-4

Date	Noise Monitoring Results	Limit Level	Exceedance?
	Leq, dB(A)	Leq, dB(A)	
02-Jan-14	68	75	N
08-Jan-14	67	75	N
15-Jan-14	74	75	N
22-Jan-14	66	75	N
29-Jan-14	67	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.





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

Graphical Presentation of Noise Monitoring Results for Locations CNM-3 and CNM-4

Date

Jan-14

APPENDIX

F

Appendix G  
Meteorological Data



**EXTRACT OF METEOROLOGICAL OBSERVATIONS FOR HONG KONG,  
JANUARY 2014 (Table 1)**

Date JANUARY	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	1019.3	18.9	15.7	13.0	6.3	54	0	-
2	1016.8	19.3	16.8	14.4	11.8	73	49	-
3	1015.7	22.5	19.8	17.2	12.9	65	28	-
4	1017.8	21.8	18.8	16.8	8.2	51	0	-
5	1018.8	18.7	16.3	14.5	8.3	60	2	-
6	1018.0	18.5	16.5	14.8	11.3	72	26	-
7	1016.8	19.1	17.8	16.5	14.4	81	88	Trace
8	1017.9	21.0	18.8	16.1	16.0	84	74	Trace
9	1022.9	16.6	15.5	14.3	9.6	68	83	-
10	1024.3	16.2	15.3	14.4	11.2	76	87	Trace
11	1023.7	18.8	16.2	14.1	12.3	78	32	-
12	1023.3	21.5	17.5	15.1	12.4	73	29	-
13	1023.6	16.2	13.9	11.8	8.0	67	50	-
14	1023.6	16.8	13.2	10.6	6.8	65	39	-
15	1025.6	16.1	13.2	11.2	6.0	62	27	-
16	1024.3	16.7	13.9	11.8	8.1	68	28	-
17	1023.3	18.9	15.5	12.7	11.0	75	15	-
18	1026.1	19.7	16.2	13.5	4.9	48	0	-
19	1026.0	16.7	14.6	13.2	8.7	69	22	-
20	1023.7	20.5	16.4	13.4	5.6	51	10	-
21	1024.5	17.6	14.9	12.9	-1.4	33	0	-
22	1025.2	17.0	13.3	10.3	0.6	43	0	-

Date JANUARY	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)				
23	1023.2	15.8	13.3	11.6	7.8	70	12	-
24	1018.8	18.5	15.6	12.9	11.7	78	46	-
25	1017.7	21.4	18.4	16.5	14.4	78	83	-
26	1019.4	24.4	19.0	16.3	14.6	76	74	-
27	1021.3	18.9	16.4	15.0	11.6	74	30	-
28	1020.4	20.3	17.0	14.8	12.3	75	21	-
29	1019.9	21.2	17.8	15.6	12.7	72	2	-
30	1019.3	22.9	18.9	15.9	14.4	75	5	-
31	1018.4	22.8	19.4	16.4	15.1	77	16	-
Mean/Total	1021.3	19.2	16.3	14.1	9.9	67	32	Trace
Normal*	1020.3	18.6	16.3	14.5	11.4	74	61	24.7
Station	Hong Kong Observatory							

**EXTRACT OF METEOROLOGICAL OBSERVATIONS FOR HONG KONG,  
JANUARY 2014 (Table 2)**

Date JANUARY	Number of hours of Reduced Visibility# (hours)	Total Bright Sunshine (hours)	Daily Global Solar Radiation (MJ/m <sup>2</sup> )	Total Evaporation (mm)	Prevailing Wind Direction (degrees)	Mean Wind Speed (km/h)
1	6	9.5	16.11	2.6	040	13.0
2	18	4.5	11.77	2.0	040	16.1
3	19	8.6	13.92	3.0	020	10.6
4	23	8.8	13.49	3.6	020	24.0
5	13	9.0	14.17	3.2	070	24.3

<b>Date JANUARY</b>	<b>Number of hours of Reduced Visibility# (hours)</b>	<b>Total Bright Sunshine (hours)</b>	<b>Daily Global Solar Radiation (MJ/m<sup>2</sup>)</b>	<b>Total Evaporation (mm)</b>	<b>Prevailing Wind Direction (degrees)</b>	<b>Mean Wind Speed (km/h)</b>
6	19	9.1	14.70	2.8	070	33.8
7	6	1.5	10.02	1.7	060	28.6
8	13	0.9	5.27	2.9	030	17.4
9	1	-	4.91	1.8	030	25.5
10	7	-	6.52	3.1	080	38.1
11	5	9.7	17.21	1.2	070	29.1
12	13	7.6	13.58	3.1	030	23.8
13	0	4.9	12.20	3.5	030	28.1
14	6	9.4	16.18	3.4	030	26.2
15	0	9.8	18.41	3.2	030	28.5
16	1	9.3	17.42	3.0	060	30.3
17	16	9.3	14.91	2.9	060	14.7
18	0	9.9	17.50	3.7	030	23.0
19	21	7.6	14.49	4.4	070	30.3
20	17	9.9	16.60	3.7	030	18.8
21	3	9.7	16.22	4.8	030	31.5
22	0	10.0	18.20	2.8	030	18.6
23	0	9.6	18.32	2.7	080	26.9
24	0	9.5	17.70	2.1	060	28.0
25	3	6.5	15.27	2.7	050	20.8
26	12	5.3	13.40	1.5	030	19.9
27	6	8.8	16.46	2.7	090	28.8
28	0	9.6	16.32	2.5	070	20.1
29	0	10.1	18.83	2.9	050	15.4

<b>Date</b> <b>JANUARY</b>	<b>Number of hours of Reduced Visibility# (hours)</b>	<b>Total Bright Sunshine (hours)</b>	<b>Daily Global Solar Radiation (MJ/m<sup>2</sup>)</b>	<b>Total Evaporation (mm)</b>	<b>Prevailing Wind Direction (degrees)</b>	<b>Mean Wind Speed (km/h)</b>
30	0	10.2	18.45	2.9	040	7.3
31	3	10.2	18.99	2.9	060	9.9
Mean/Total	231	238.8	14.76	89.3	040	22.9
Normal*	253.4§	143.0	10.17	71.3	060	25.3
Station	Hong Kong International Airport	King's Park		Waglan Island		

The minimum pressure recorded at the Hong Kong Observatory was 1013.7 hectopascals at 1450 HKT on 3 January.

The maximum air temperature recorded at the Hong Kong Observatory was 24.4 degrees C at 1323 HKT on 26 January.

The minimum air temperature recorded at the Hong Kong Observatory was 10.3 degrees C at 0741 HKT on 22 January.

The maximum gust peak speed recorded at Waglan Island was 62 kilometres per hour from 030 degrees at 2204 HKT on 20 January.

- # 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.

\* 1981 – 2010 Climatological Normal, unless otherwise specified

§ 1997 – 2012 Mean value

Appendix H  
Calibration Certificates of  
Sound Level Meters



# Certificate of Calibration 校正證書

Certificate No. : C140170  
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-3204)      Date of Receipt / 收件日期 : 7 January 2014

Description / 儀器名稱 : Sound Level Meter  
Manufacturer / 製造商 : Brüel & Kjær  
Model No. / 型號 : 2250-L  
Serial No. / 編號 : 2701816  
Supplied By / 委託者 : EDMS Consulting Ltd.  
Unit 1C, 24/F., World Wide House, 19 Des Voeux Road Central,  
Hong Kong

## TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C      Relative Humidity / 相對濕度 : (55 ± 20)%  
Line Voltage / 電壓 : ---

## TEST SPECIFICATIONS / 測試規範

Calibration check


DATE OF TEST / 測試日期 : 8 January 2014

## TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.  
All results are within manufacturer's specification.  
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By :   
測試 : K C Lee  
Project Engineer

Certified By :   
核證 : K M Wu  
Engineer

Date of Issue : 9 January 2014  
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室所書而批准。

# Certificate of Calibration

## 校正證書

Certificate No. : C140170  
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- Self-calibration using laboratory acoustic calibrator was performed before the test 6.1.1.2 to 6.3.2.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C140016
CL281	Multifunction Acoustic Calibrator	DC130171

- Test procedure : MA101N.

- Results :

### 6.1 Sound Pressure Level

#### 6.1.1 Reference Sound Pressure Level

##### 6.1.1.1 Before Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	93.8

##### 6.1.1.2 After Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	± 1.1

### 6.1.2 Linearity

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.0 (Ref.)
		104.00		104.0
		114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室所書而批准。

# Certificate of Calibration

## 校正證書

Certificate No. : C140170  
證書編號

### 6.2 Time Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	Ref.
	LAS (SPL)			94.0	± 0.3

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LAF (SPL)	94.00	63 Hz	67.8	-26.2 ± 1.5
			125 Hz	77.8	-16.1 ± 1.5
			250 Hz	85.3	-8.6 ± 1.4
			500 Hz	90.7	-3.2 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	95.2	+1.2 ± 1.6
			4 kHz	94.9	+1.0 ± 1.6
			8 kHz	92.5	-1.1(+2.1 ; -3.1)
			12.5 kHz	89.4	-4.3(+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LCF (SPL)	94.00	63 Hz	93.2	-0.8 ± 1.5
			125 Hz	93.8	-0.2 ± 1.5
			250 Hz	94.0	0.0 ± 1.4
			500 Hz	94.0	0.0 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	93.8	-0.2 ± 1.6
			4 kHz	93.1	-0.8 ± 1.6
			8 kHz	90.6	-3.0(+2.1 ; -3.1)
			12.5 kHz	87.5	-6.2(+3.0 ; -6.0)

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C140170  
證書編號

- Remarks : - UUT Microphone Model No. : 4950 & S/N : 2678774
- Mfr's Spec. : IEC 61672 Class 1
  - Uncertainties of Applied Value : 94 dB : 63 Hz - 125 Hz :  $\pm 0.35$  dB  
250 Hz - 500 Hz :  $\pm 0.30$  dB  
1 kHz :  $\pm 0.20$  dB  
2 kHz - 4 kHz :  $\pm 0.35$  dB  
8 kHz :  $\pm 0.45$  dB  
12.5 kHz :  $\pm 0.70$  dB  
104 dB : 1 kHz :  $\pm 0.10$  dB (Ref. 94 dB)  
114 dB : 1 kHz :  $\pm 0.10$  dB (Ref. 94 dB)
  - The uncertainties are for a confidence probability of not less than 95 %.

### Note :

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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Sun Creation Engineering Limited – Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 – 校正及檢測實驗室

c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com



# Certificate of Calibration 校正證書

Certificate No. : C140582  
證書編號

ITEM TESTED / 送檢項目 ( Job No. / 序引編號 : IC14-0073 )      Date of Receipt / 收件日期 : 25 January 2014

Description / 儀器名稱 : Sound Level Meter  
Manufacturer / 製造商 : Brüel & Kjær  
Model No. / 型號 : 2250-L  
Serial No. / 編號 : 2701826  
Supplied By / 委託者 : EDMS Consulting Ltd.  
Unit 1C, 24/F., World Wide House, 19 Des Voeux Road Central,  
Hong Kong

## TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C      Relative Humidity / 相對濕度 : (55 ± 20)%  
Line Voltage / 電壓 : ---

## TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 28 January 2014

## TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.  
All results are within manufacturer's specification.  
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By :   
測試 : K C Lee  
Project Engineer

Certified By :   
核證 : K M Wu  
Engineer

Date of Issue : 28 January 2014  
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C140582

證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. The results presented are the mean of 3 measurements at each calibration point.
3. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C140016
CL281	Multifunction Acoustic Calibrator	DC130171

4. Test procedure : MA101N.

5. Results :

- 5.1 Sound Pressure Level

- 5.1.1 Reference Sound Pressure Level

<u>UUT Setting</u>		<u>Applied Value</u>		<u>UUT Reading</u> (dB)	<u>IEC 61672 Class 1</u> <u>Spec. (dB)</u>
<u>Range (dB)</u>	<u>Main</u>	<u>Level (dB)</u>	<u>Freq. (kHz)</u>		
20 - 140	LAF (SPL)	94.00	1	94.0	± 1.1

- 5.1.2 Linearity

<u>UUT Setting</u>		<u>Applied Value</u>		<u>UUT Reading</u> (dB)
<u>Range (dB)</u>	<u>Main</u>	<u>Level (dB)</u>	<u>Freq. (kHz)</u>	
20 - 140	LAF (SPL)	94.00	1	94.0 (Ref.)
		104.00		104.0
		114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

- 5.2 Time Weighting

<u>UUT Setting</u>		<u>Applied Value</u>		<u>UUT Reading</u> (dB)	<u>IEC 61672 Class 1</u> <u>Spec. (dB)</u>
<u>Range (dB)</u>	<u>Main</u>	<u>Level (dB)</u>	<u>Freq. (kHz)</u>		
20 - 140	LAF (SPL)	94.00	1	94.0	Ref.
	LAS (SPL)			94.0	± 0.3

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C140582

證書編號

### 5.3 Frequency Weighting

#### 5.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LAF (SPL)	94.00	63 Hz	67.8	-26.2 ± 1.5
			125 Hz	77.8	-16.1 ± 1.5
			250 Hz	85.3	-8.6 ± 1.4
			500 Hz	90.7	-3.2 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	95.1	+1.2 ± 1.6
			4 kHz	94.8	+1.0 ± 1.6
			8 kHz	92.5	-1.1(+2.1 ; -3.1)
			12.5 kHz	89.3	-4.3(+3.0 ; -6.0)

#### 5.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LCF (SPL)	94.00	63 Hz	93.2	-0.8 ± 1.5
			125 Hz	93.8	-0.2 ± 1.5
			250 Hz	94.0	0.0 ± 1.4
			500 Hz	94.0	0.0 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	93.8	-0.2 ± 1.6
			4 kHz	93.0	-0.8 ± 1.6
			8 kHz	90.6	-3.0 (+2.1 ; -3.1)
			12.5 kHz	87.4	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : 4950 & S/N : 2678784

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value : 94 dB : 63 Hz - 125 Hz : ± 0.35 dB  
 250 Hz - 500 Hz : ± 0.30 dB  
 1 kHz : ± 0.20 dB  
 2 kHz - 4 kHz : ± 0.35 dB  
 8 kHz : ± 0.45 dB  
 12.5 kHz : ± 0.70 dB  
 104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

#### Note :

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室所書面批准。

# Certificate of Calibration

## 校正證書

Certificate No. : C137989

證書編號

ITEM TESTED / 送檢項目 ( Job No. / 序引編號 : IC13-3204 )

Description / 儀器名稱 : Sound Level Meter

Manufacturer / 製造商 : Brüel & Kjær

Model No. / 型號 : 2250-L

Serial No. / 編號 : 2701823

Supplied By / 委託者 : EDMS Consulting Ltd.

Unit 1C, 24/F., World Wide House, 19 Des Voeux Road Central,  
Hong Kong

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C

Relative Humidity / 相對濕度 : (55 ± 20)%

Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 17 December 2013

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.

All results are within manufacturer's specification.

The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By

:   
K C Lee

測試

Certified By

:   
H C Chan

核證

Date of Issue

: 19 December 2013

簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室所書面批准。

# Certificate of Calibration

## 校正證書

Certificate No. : C137989

證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration using laboratory acoustic calibrator was performed before the test 6.1.1.2 to 6.3.2.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C130019
CL281	Multifunction Acoustic Calibrator	DC130171

5. Test procedure : MA101N.

6. Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

- 6.1.1.1 Before Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.2

- 6.1.1.2 After Self-calibration

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	± 1.1

- 6.1.2 Linearity

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	94.0 (Ref.)
		104.00		104.0
		114.00		114.0

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

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### 6.2 Time Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	94.0	Ref.
	LAS (SPL)			94.0	± 0.3

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LAF (SPL)	94.00	63 Hz	67.8	-26.2 ± 1.5
			125 Hz	77.8	-16.1 ± 1.5
			250 Hz	85.3	-8.6 ± 1.4
			500 Hz	90.7	-3.2 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	95.2	+1.2 ± 1.6
			4 kHz	94.9	+1.0 ± 1.6
			8 kHz	92.5	-1.1(+2.1 ; -3.1)
			12.5 kHz	89.4	-4.3(+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LCF (SPL)	94.00	63 Hz	93.2	-0.8 ± 1.5
			125 Hz	93.8	-0.2 ± 1.5
			250 Hz	94.0	0.0 ± 1.4
			500 Hz	94.0	0.0 ± 1.4
			1 kHz	94.0	Ref.
			2 kHz	93.8	-0.2 ± 1.6
			4 kHz	93.1	-0.8 ± 1.6
			8 kHz	90.6	-3.0 (+2.1 ; -3.1)
			12.5 kHz	87.5	-6.2 (+3.0 ; -6.0)

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# Certificate of Calibration

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- Remarks : - UUT Microphone Model No. : 4950 & S/N : 2678781
- Mfr's Spec. : IEC 61672 Class 1
  - Uncertainties of Applied Value : 94 dB : 63 Hz - 125 Hz :  $\pm 0.35$  dB  
250 Hz - 500 Hz :  $\pm 0.30$  dB  
1 kHz :  $\pm 0.20$  dB  
2 kHz - 4 kHz :  $\pm 0.35$  dB  
8 kHz :  $\pm 0.45$  dB  
12.5 kHz :  $\pm 0.70$  dB  
104 dB : 1 kHz :  $\pm 0.10$  dB (Ref. 94 dB)  
114 dB : 1 kHz :  $\pm 0.10$  dB (Ref. 94 dB)
  - The uncertainties are for a confidence probability of not less than 95 %.

Note :

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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