


MTR Corporation Limited

ROAD WORKS at WEST KOWLOON

(No. EP-366/2009/A)

Environmental Monitoring and Audit Report No. 20

(February 2013)

Certified by : 
Position : Independent Environmental Checker
Date : 14 March 2013

MTR Corporation Limited

ROAD WORKS at WEST KOWLOON

(No. EP-366/2009/A)

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Position

:

Environmental Team Leader

Date

:

14 MAR 2013



ROADWORKS AT WEST KOWLOON



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EXECUTIVE SUMMARY

This is the 20th monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works undertaken during the period from 1 to 28 February 2013 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 no environmental complaint referred from EPD. Complaint investigations would be conducted in accordance with the complaint handling procedure in the EM&A Manual if receive.

For the reporting month, one (1) noise exceedance of air-borne noise Limit Level was recorded in the reporting month. There was no noise exceedance of Action Level triggered 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 February 2013 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 20th monthly Environmental Monitoring and Audit (EM&A) Report presenting the EM&A works undertaken during the period from 1 to 28 February 2013 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 20th month of civil construction in Works Area in West Kowloon for February 2013. 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.

| Contract | Major Construction Activities |
|-----------------|--|
| 810A | Cable Slewing to Existing Footpath; Excavation; H-pile Installation and Grouting; Sheetpile; Removal of GC Culvert; and Trial Pit/ Predrilling |
| 810B | Bore piling, Sheet piling, Drainage Work and Road Diversion |
| 811B | Site clearance and road formation work for later road diversion |

Table 2-1 Major construction activities in February 2013

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 28 February 2013 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 2013) | Submitted on 15 February 2013. |

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 |
|-----------------------------------|--|------------------|--|
| Contract 810A | | | |
| 1 | Construction Noise Permit (General works) | 24 Jan 2013 | Granted on 1 Feb 2013 Permit No. GW-RE0111-13, valid from 5 Feb 2013 to 4 Aug 2013 |
| Contract 810B | | | |
| 1 | Construction Noise Permit (General works) | 18 Feb 2013 | Granted on 26 Feb 2013 Permit No. GW-RE0188-13, valid on 1 Mar 2013 to 7 Mar 2013 |
| 2 | Construction Noise Permit (General works) | 20 Feb 2013 | Granted on 4 Mar 2013 Permit No. GW-RE0206-13, valid on 7 Mar 2013 to 28 Mar 2013 |
| 3 | Construction Noise Permit (General works) | 12 Jan 2013 | Granted on 29 Jan 2013 Permit No. GW-RE0091-13, valid on 2 Feb 2013 to 12 Mar 2013 |
| 4 | Dumping Permit for Type 1 marine sediment | 28 Dec 2012 | Granted on 29 Jan 2013 Permit No. EP/MD/13-122, valid from 1 Feb 2013 to 31 Jul 2013 |
| 5 | Dumping Permit for Type 2 marine sediment | 28 Dec 2012 | Granted on 15 Feb 2013 Permit No. EP/MD/13-116, valid from 18 Feb 2013 to 17 Mar 2013 |
| 6 | Dumping Permit for Type 3 marine sediment | 28 Dec 2012 | Granted on 21 Jan 2013 Permit No. EP/MD/13-117, valid from 28 Jan 2013 to 27 Feb 2013 |
| Contract 811B | | | |
| 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 | 9 Nov 2012 |
| CAM-2 | Podium next to Tower 3, The Waterfront | 1282 | 9 Nov 2012 |
| CAM-3 | Roof of Lift Building, The Victoria Towers | 528 | 9 Nov 2012 |

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.

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. Summary of the calibration record is shown in Table 4-4 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 | 2701816 | 24 January 2013 |
| CNM-2 | Tower 6, Sorrento | 2701826 | 28 January 2013 |
| CNM-3 | Podium next to Tower 3, The Waterfront | 2701823 | 19 January 2013 |
| CNM-4 | Tower 2, The Harbour Side | 2701886 | 26 May 2012 |
| <i>Calibrator</i> | | | |
| Serial Number | | Last Calibration Date | |
| N674902 | | 13 November 2012 | |

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, one noise exceedances of air-borne noise Limit Level was recorded in the reporting month.

For the noise exceedances at the monitoring station CNM-3, actions identified in the Event and Action Plan (Table 2.3 of the EM&A Manual) were undertaken. The ER, IEC and Contractor were informed of the exceedance. The investigation results revealed that noise source might be caused by the construction activities under the Roadworks by the Contractors of 810A. Noise mitigation measures were proposed and implemented on site to minimize the noise impact. Besides, the Contractors were reminded to comply with the statutory requirement and minimize the noise nuisance to the nearby NSRs.

Apart from the above, there was no noise exceedance of Action Level triggered 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 ^[1] Materials (tonnes) | Non-inert C&D ^[2] Materials (tonnes) | Chemical Waste (kg) |
|-------------------------------------|---|---|------------------------|
| Contract 810A ^[3] | | | |
| December 2012 | 1180.0 | 0 | 0 |
| January 2013 | 167.5 | 0 | 0 |
| February 2013 | 79.1 | 0 | 217.0 |
| Contract 810B ^[4] | | | |
| December 2012 | 630.0 | 35.3 | 0 |
| January 2013 | 511.0 | 29.3 | 0 |
| February 2013 | 298.0 | 16.3 | 0 |
| Contract 811B ^[5] | | | |
| December 2012 | 0 | 0 | 0 |
| January 2013 | 480.0 | 0 | 0 |
| February 2013 | 240.0 | 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 (mainly asphalt) from 810A include WENT Landfill and SENT 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 21 February 2013 in 810A, 6 February 2013 in 810B and 5 February 2013 in 811B.

| Contract | Date of Site Inspections |
|-----------------|---------------------------------|
| 810A | 7/2, 14/2, 21/2 and 28/2 |
| 810B | 6/2, 14/2, 20/2 and 27/2 |
| 811B | 5/2, 15/2, 20/2 and 27/1 |

Table 6-1 Date of site inspections in February 2013

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 | Water was found leaking out to the public road from the gap of water barriers placed along Lin Cheung Road near Sorrento. | Sandbags have been placed at the gap to avoid recurrence. |

| Item | Description | Contractor's Follow-up Action(s) Undertaken |
|----------------------|--|--|
| Contract 810B | | |
| 1 | Excessive noise was generated when sheet piling was in progress and affected the public. | Acoustic sheet has been used to cover the vibrating hammer to reduce the noise impact. |
| Contract 811B | | |
| 1 | Smoke was observed emitting from the power generator at Old Jordan Road works area near Elements | The generator has been maintained and no smoke emitted after checking. |

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 eighteen (18) 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 if receive.

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, one (1) exceedance of air-borne noise Limit Level was recorded at the Waterfront (CNM-3) on 6 February 2013 in the reporting month.

For the air-borne noise exceedances at monitoring station CNM-3, actions identified in the Event and Action Plan (Table 2.3 of the EM&A Manual) were undertaken. The ER, IEC and Contractors were informed of the exceedance. It was likely caused by the construction activities under road works by the Contractors of 810A. Noise mitigation measures implemented on site were proposed by the Contractors and were reviewed by IEC and ET by time to time

There was no air-borne noise exceedance of Action Level triggered in the reporting month and no exceedances of 24-hr TSP Action and Limit Level were recorded in the reporting month.

Apart from the above, actions stipulated under the Event and Action Plan (Table 3.3 of the EM&A Manual) would be implemented for the exceedances 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.

| Contract | Major Construction Activities |
|-----------------|---|
| 810A | Predrilling; Excavation and Casing Installation; Sheetpile Driving; Expose Existing Utilities; Support channel installation, Cable Slewing to Existing Footpath; and Bracing Installation |
| 810B | Bore piling; Sheet piling; Drainage Work and Road Diversion |
| 811B | Road formation work for Temporary Road D1A big-flip diversion, Remaining road works after the big-flip diversion |

Table 8-1 Summary of construction works in the coming month (i.e. March 2013)

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 28 February 2013. The major construction activities in the reporting period included foundation works in the West Kowloon Works Areas.

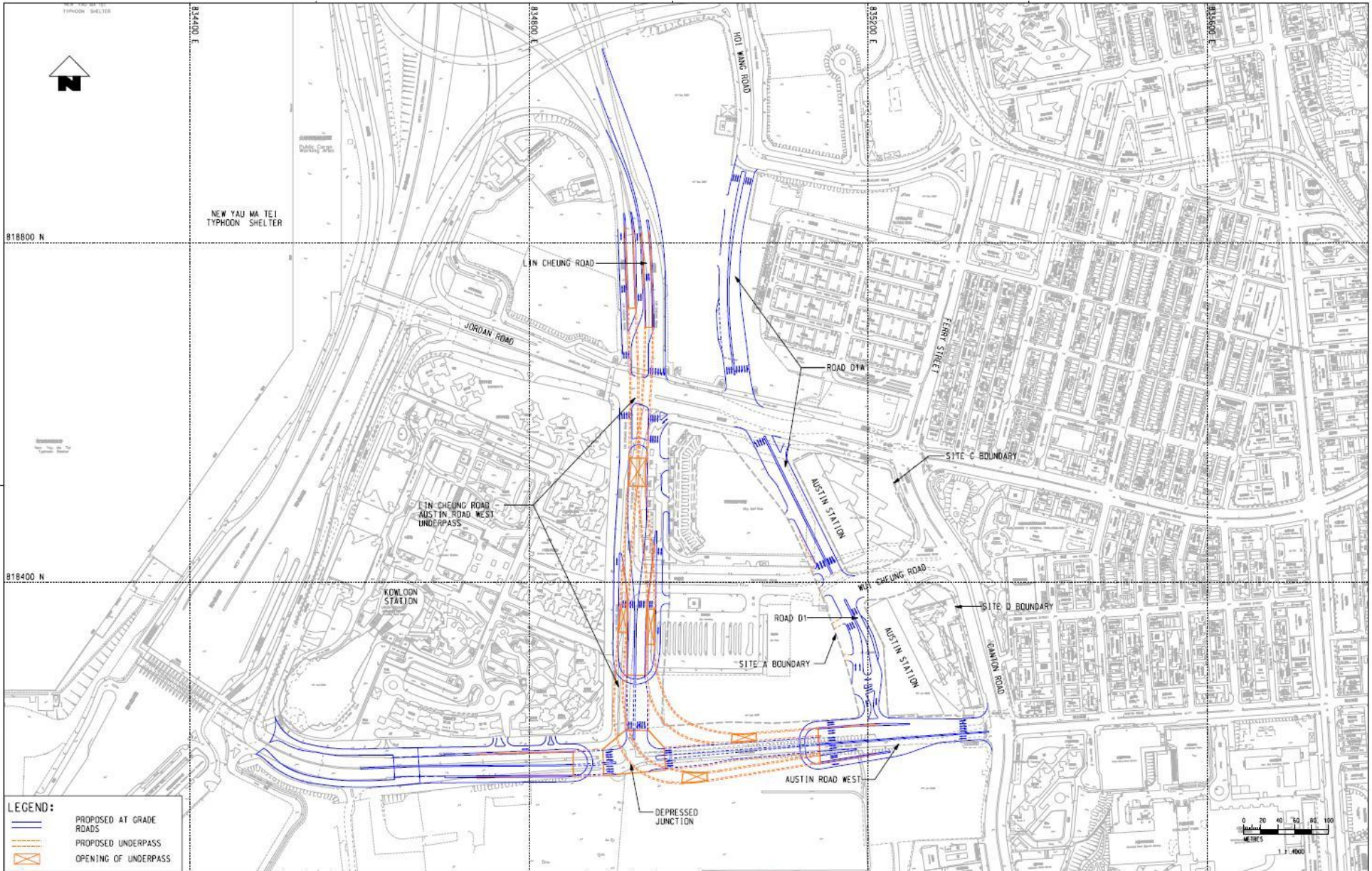
Impact monitoring for air quality and air-borne noise were conducted in accordance with the EM&A Manual in the reporting period. One exceedance of Limit Levels in air-borne noise was recorded in the reporting month. No exceedance of Action Levels in air-borne noise; no exceedance of 24-hour TSP Action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

For the reporting month, no environmental complaint was referred from EPD. The complaint would be handled in accordance with the procedures stipulated and investigations should be carried out in accordance with the EM&A Manual when complaint received. 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



| | | | | | | | | | | | | |
|---|-------------|--|------|---|-----|---|----|------|----------|---------------|-------------------------------|------|
| LEGEND: PROPOSED AT GRADE ROADS PROPOSED UNDERPASS OPENING OF UNDERPASS | | DRAWN YJP DESIGNED TNF CHECKED KCC APPROVED PL DATE 11/MAR./2009 | | ROAD WORKS AT WEST KOWLOON PROJECT DIVISION | | TITLE PROPOSED ROAD WORKS AT WEST KOWLOON | | | | | | |
| 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

| Title | Name | Telephone |
|---|---------------------|------------------|
| Engineer's Representative | | |
| Construction Manager (Contract 810A) | Mr. Samuel LO | 2926 9002 |
| Construction Manager (Contract 810A) | Mr. Stephen BOREMAN | 2926 9170 |
| Senior Construction Engineer (Contract 810A) | Mr. Vincent LEE | 2926 9022 |
| Senior Construction Engineer (Contract 810A) | Mr. Pete CHAN | 2926 9162 |
| Construction Manager (Contract 810B) | Mr. KS LIM | 2926 9098 |
| Senior Construction Engineer (Contract 810B) | Mr. William MAK | 2926 9238 |
| Construction Manager (Contract 811B) | Mr. Albert LAM | 2164 2988 |
| Senior Construction Engineer (Contract 811B) | Mr. Larry WONG | 2164 2911 |
| Independent Environmental Checker | | |
| Divisional Manager | Dr. Anne KERR | 2828 5793 |
| Environmental Team | | |
| Environmental Team Leader | Mr. Richard KWAN | 2688 1179 |
| Contractors | | |
| <i>Contract 810A</i> | | |
| Project Director - Civil | Mr. Elias ZRAICAT | 9732 9971 |
| Environmental Manger | Ms. Lighting CHAN | 6323 9396 |
| Environmental Officer | Mr. Calvin SO | 9664 0361 |
| Environmental Officer | Ms. Shirley LUI | 9664 2544 |
| <i>Contract 810B</i> | | |
| Project Director | Mr. Smollett LEE | 6629 4441 |
| Environmental Manger | Mr. Calvin SZE | 9205 9277 |
| Environmental Officer | Ms. Julie CHEN | 9106 8864 |
| <i>Contract 811B</i> | | |
| Project Manager | Mr. Chris WILLIAMS | 9669 2665 |
| Environmental Manger | Mr. Brian KAM | 9456 9541 |
| Environmental Officer | Ms. Sammie CHAN | 6407 3833 |

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 |
|----------------------|---|--|--------------------------------|---|---|
| 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. |

| 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. |

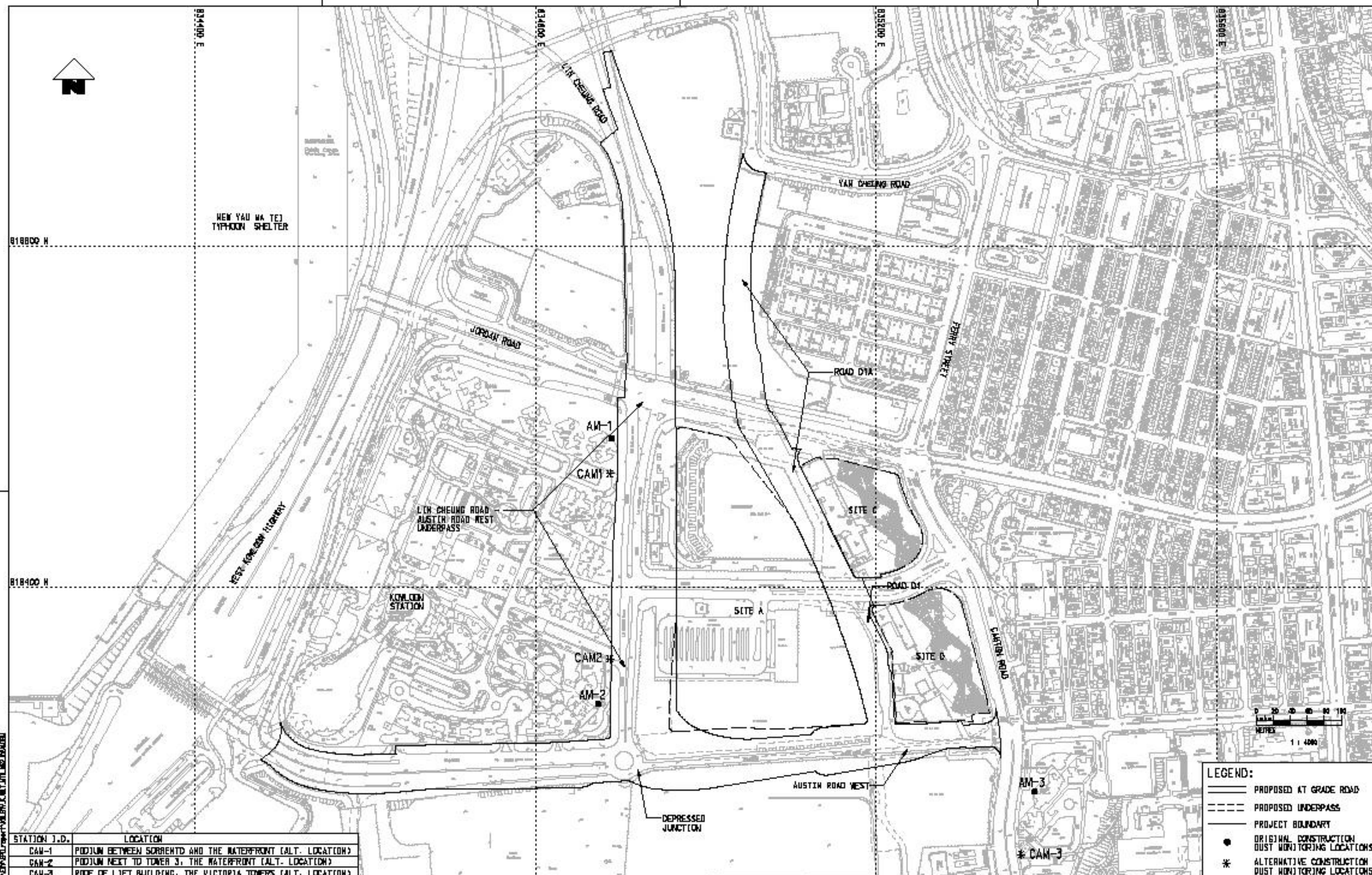
| EIA Ref # | Environmental Protection Measures / Mitigation Measures | Objectives of the Recommended Measures & Main Concern to Address | Who to implement the measures? | When to implement the measures? | Implementation Status |
|-----------|--|--|--------------------------------|---|-----------------------|
| 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. |
| Landscaping 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 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 | | | |

| | |
|----------|-------------|
| 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 | REV A1 |

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 DATE: 05/05/11
 DRAWN BY: YCC
 CHECKED BY: MC
 APPROVED BY: YCC
 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 |

EXPRESS RAIL LINK
 PROJECTS DIVISION | SUSTAINABILITY DEVELOPMENT DEPARTMENT
 ORIGINATOR
 CADD REF. XRLNV_K_WKT_MTR_M52_101A1.DGN

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

Appendix E
Monitoring Schedule

Actual Construction Dust (24-hr TSP) and Air-borne Noise Impact Monitoring Schedule - February 2013

Notes: **TSP** denotes Total Suspended Particulates

| Feb-2013 | | | | | | |
|----------|--------|------------------------------------|---|---|--------------------------|--------------------------|
| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
| | | | | | 1 | 2 CAM-1, CAM-2, CAM-3 |
| 3 | 4 | 5 | 6 CNM-2, CNM-3, CNM-4 | 7 CNM-1 | 8 CAM-1, CAM-2, CAM-3 | 9 |
| 10 | 11 | 12 | 13 | 14 CNM-1, CNM-2 CNM-3, CNM-4 CAM-1, CAM-2, CAM-3 | 15 | 16 |
| 17 | 18 | 19 | 20 CNM-1, CNM-2 CNM-3, CNM-4 CAM-1, CAM-2, CAM-3 | 21 | 22 | 23 |
| 24 | 25 | 26 CNM-3 CAM-1, CAM-2, CAM-3 | 27 CNM-1, CNM-2, CNM-4 | 28 | | |

Tentative Construction Dust (24-hr TSP) and Air-borne Noise Impact Monitoring Schedule - March 2013

Notes: TSP denotes Total Suspended Particulates

| Mar-2013 | | | | | | |
|----------|--------------------------|---------------------------|------------------------------------|------------------------------------|---------------------------|--------------------------|
| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
| | | | | | 1 | 2 CAM-1, CAM-2, CAM-3 |
| 3 | 4 CAM-1, CAM-2, CAM-3 | 5 | 6 CNM-1, CNM-2 CNM-3, CNM-4 | 7 | 8 | 9 CAM-1, CAM-2, CAM-3 |
| 10 | 11 | 12 | 13 | 14 CNM-1, CNM-2 CNM-3, CNM-4 | 15 CAM-1, CAM-2, CAM-3 | 16 |
| 17 | 18 | 19 | 20 CNM-1, CNM-2 CNM-3, CNM-4 | 21 CAM-1, CAM-2, CAM-3 | 22 | 23 |
| 24 | 25 | 26 CAM-1, CAM-2, CAM-3 | 27 CNM-1, CNM-2 CNM-3, CNM-4 | 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-13 | 73.2 | 168.8 | 260.0 |
| 08-Feb-13 | 39.3 | 168.8 | 260.0 |
| 14-Feb-13 | 38.0 | 168.8 | 260.0 |
| 20-Feb-13 | 64.0 | 168.8 | 260.0 |
| 26-Feb-13 | 70.7 | 168.8 | 260.0 |

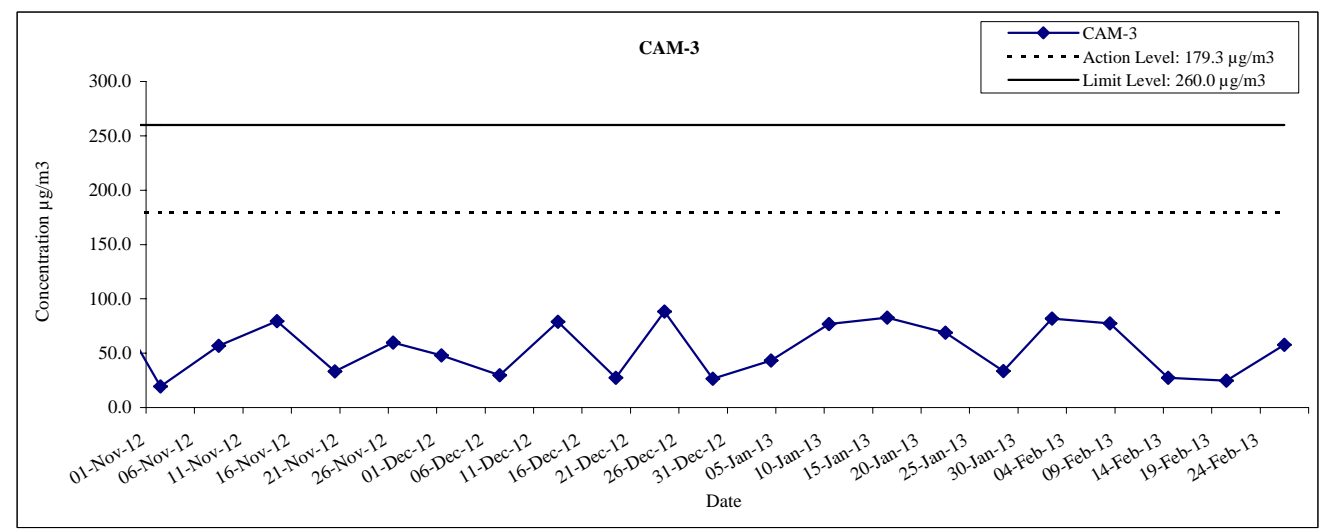
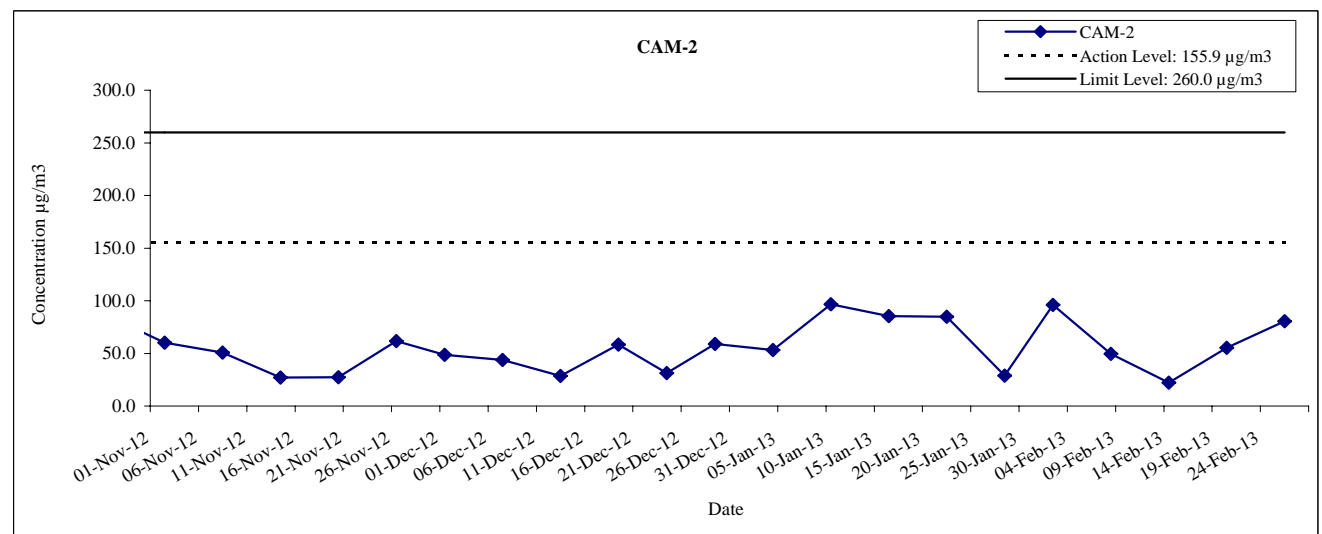
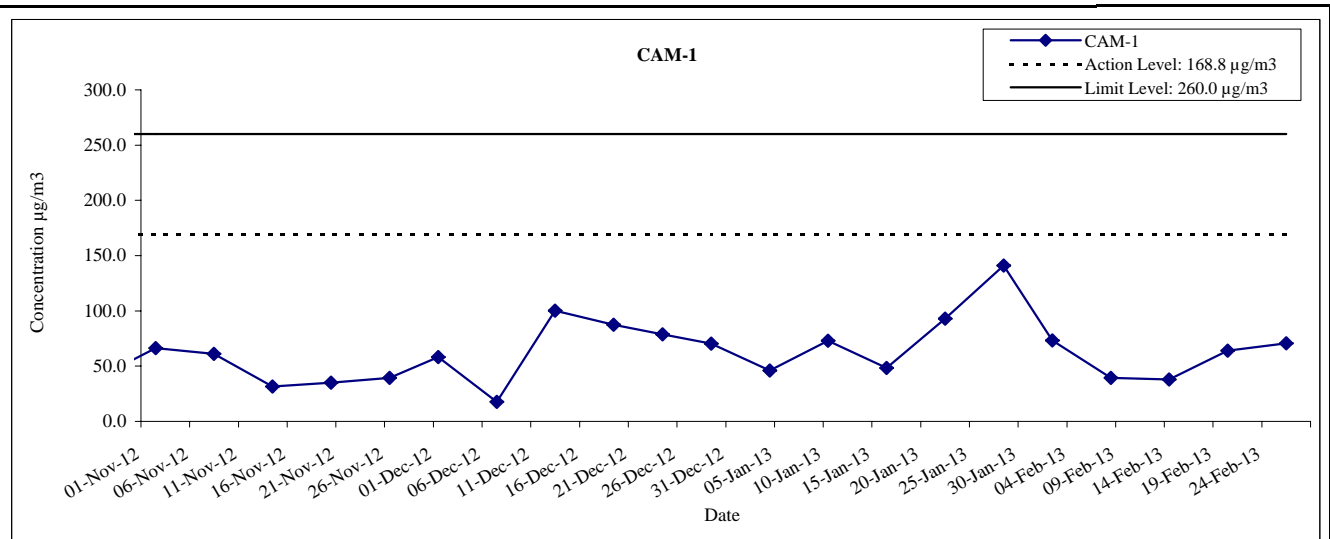
- CAM-2


| 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-13 | 96.1 | 155.9 | 260.0 |
| 08-Feb-13 | 49.4 | 155.9 | 260.0 |
| 14-Feb-13 | 22.2 | 155.9 | 260.0 |
| 20-Feb-13 | 55.2 | 155.9 | 260.0 |
| 26-Feb-13 | 80.4 | 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-13 | 81.8 | 179.3 | 260.0 |
| 08-Feb-13 | 77.5 | 179.3 | 260.0 |
| 14-Feb-13 | 27.3 | 179.3 | 260.0 |
| 20-Feb-13 | 24.6 | 179.3 | 260.0 |
| 26-Feb-13 | 57.6 | 179.3 | 260.0 |

Remark: Bold value indicated an Action level exceedance
 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-13 |
| | | APPENDIX | F |

APPENDIX F: Noise Monitoring Results

- CNM-1

| Date | Noise Monitoring Results | Limit Level | Exceedance? |
|-----------|--------------------------|-------------|-------------|
| | Leq, dB(A) | Leq, dB(A) | |
| 07-Feb-13 | 71 | 75 | N |
| 14-Feb-13 | 70 | 75 | N |
| 20-Feb-13 | 69 | 75 | N |
| 27-Feb-13 | 74 | 75 | N |

- CNM-2

| Date | Noise Monitoring Results | Limit Level | Exceedance? |
|-----------|--------------------------|-------------|-------------|
| | Leq, dB(A) | Leq, dB(A) | |
| 06-Feb-13 | 75 | 75 | N |
| 14-Feb-13 | 73 | 75 | N |
| 20-Feb-13 | 74 | 75 | N |
| 27-Feb-13 | 75 | 75 | N |

- CNM-3 ^[a]

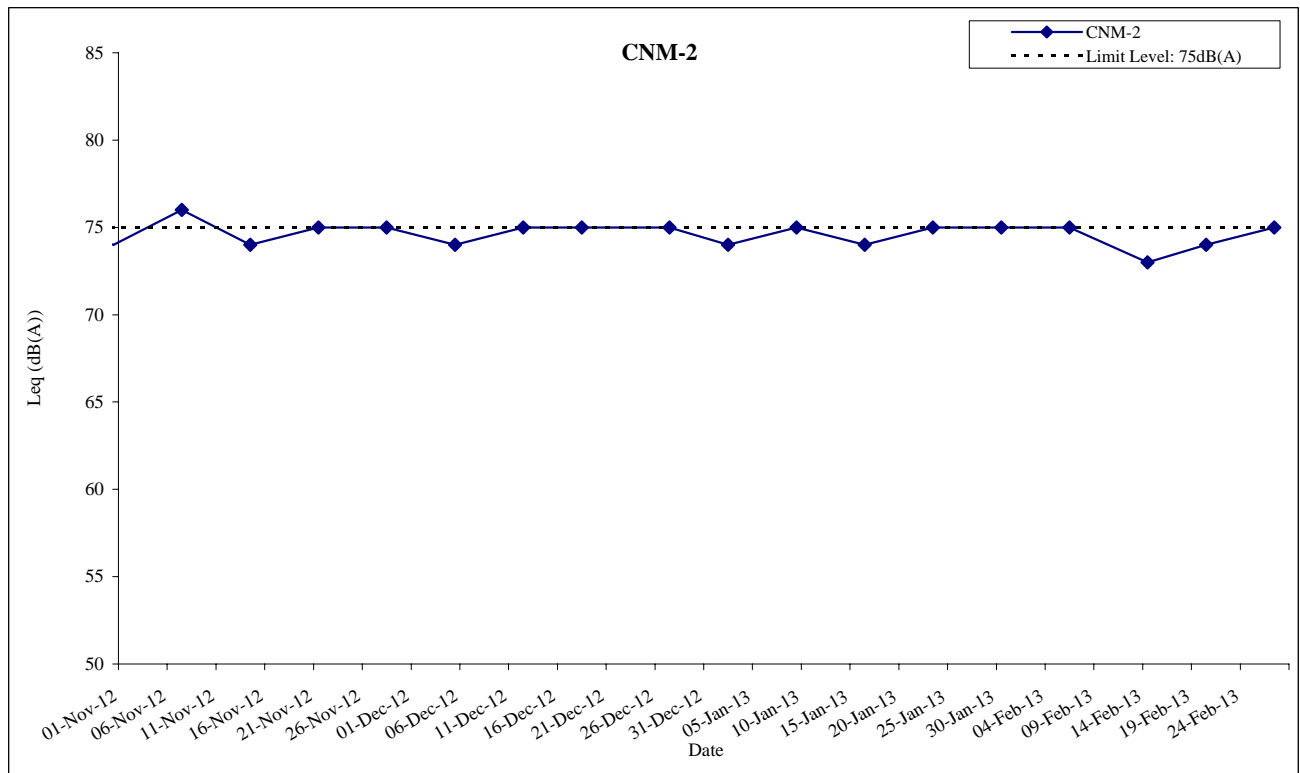
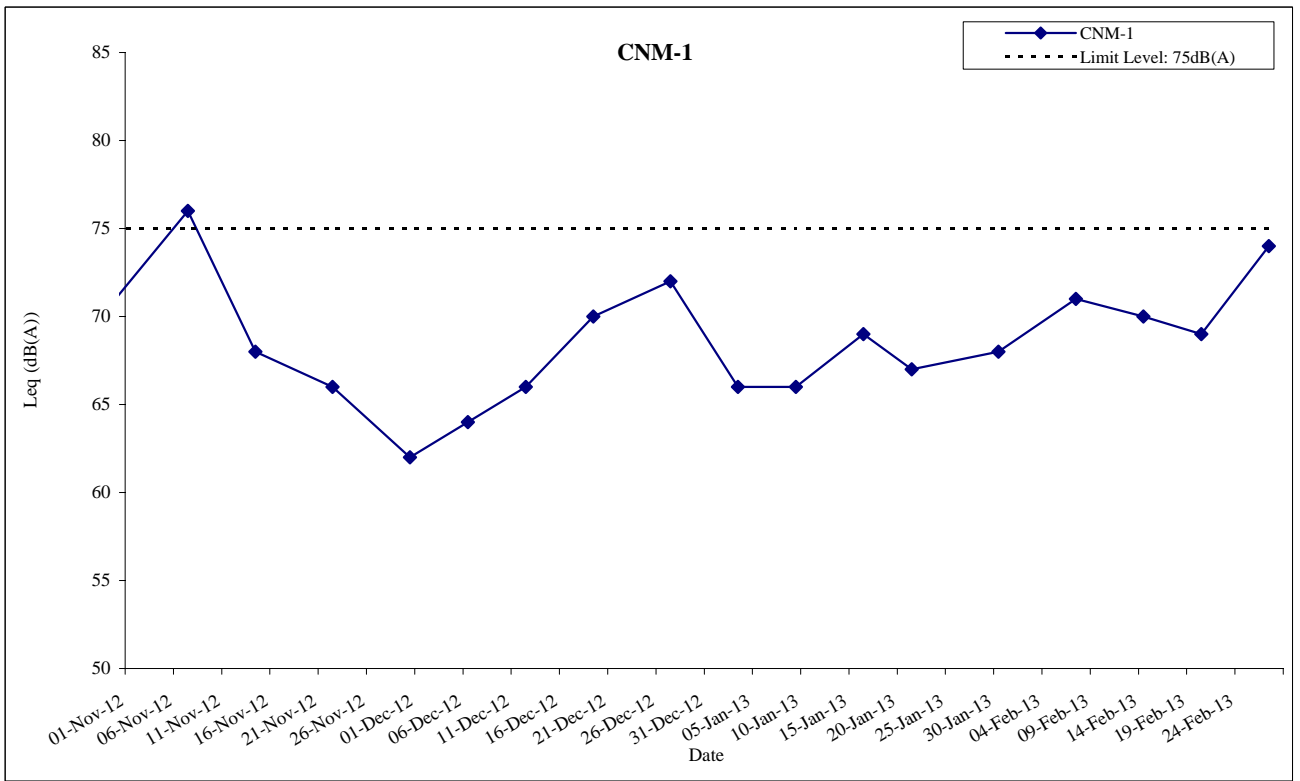
| Date | Noise Monitoring Results | Limit Level | Exceedance? |
|-----------|--------------------------|-------------|-------------|
| | Leq, dB(A) | Leq, dB(A) | |
| 06-Feb-13 | 77 | 75 | Y |
| 14-Feb-13 | 75 | 75 | N |
| 20-Feb-13 | 75 | 75 | N |
| 26-Feb-13 | 75 | 75 | N |

- CNM-4

| Date | Noise Monitoring Results | Limit Level | Exceedance? |
|-----------|--------------------------|-------------|-------------|
| | Leq, dB(A) | Leq, dB(A) | |
| 06-Feb-13 | 65 | 75 | N |
| 14-Feb-13 | 73 | 75 | N |
| 20-Feb-13 | 67 | 75 | N |
| 27-Feb-13 | 66 | 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

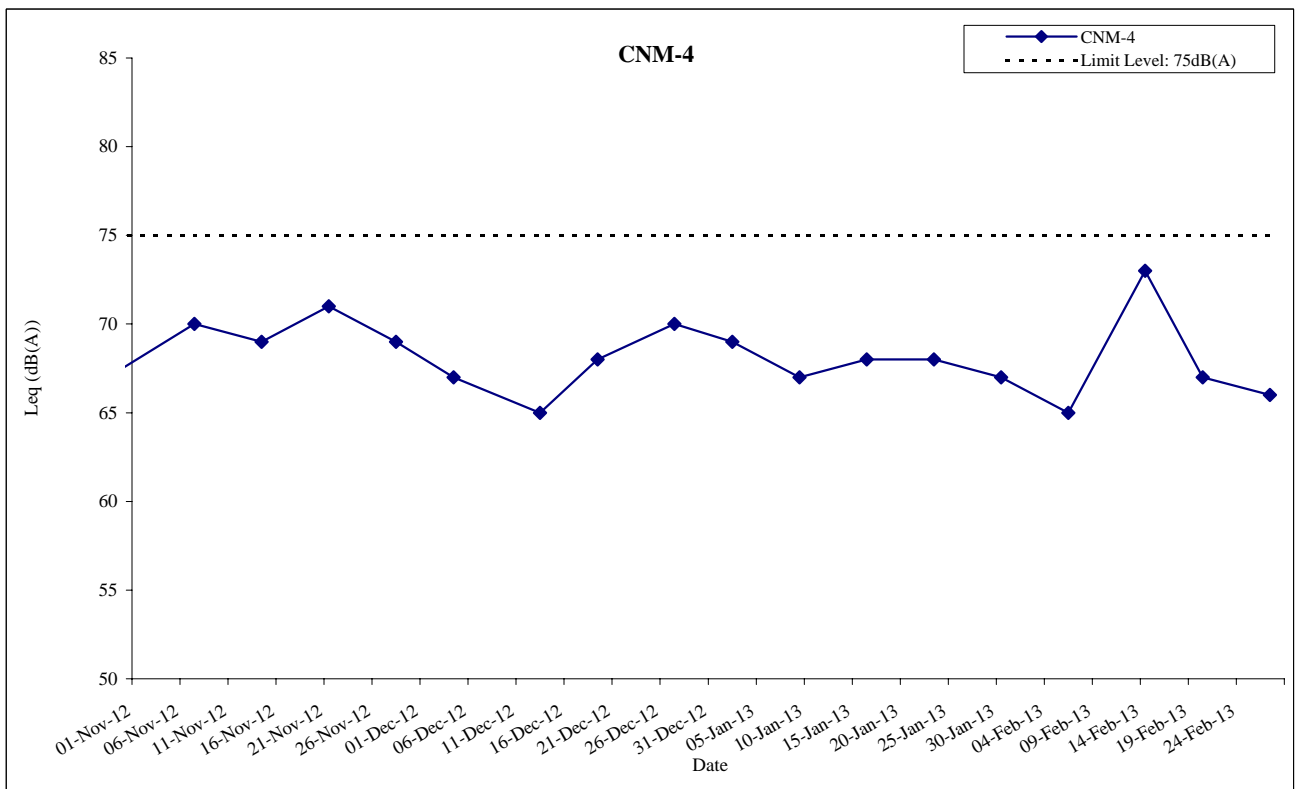
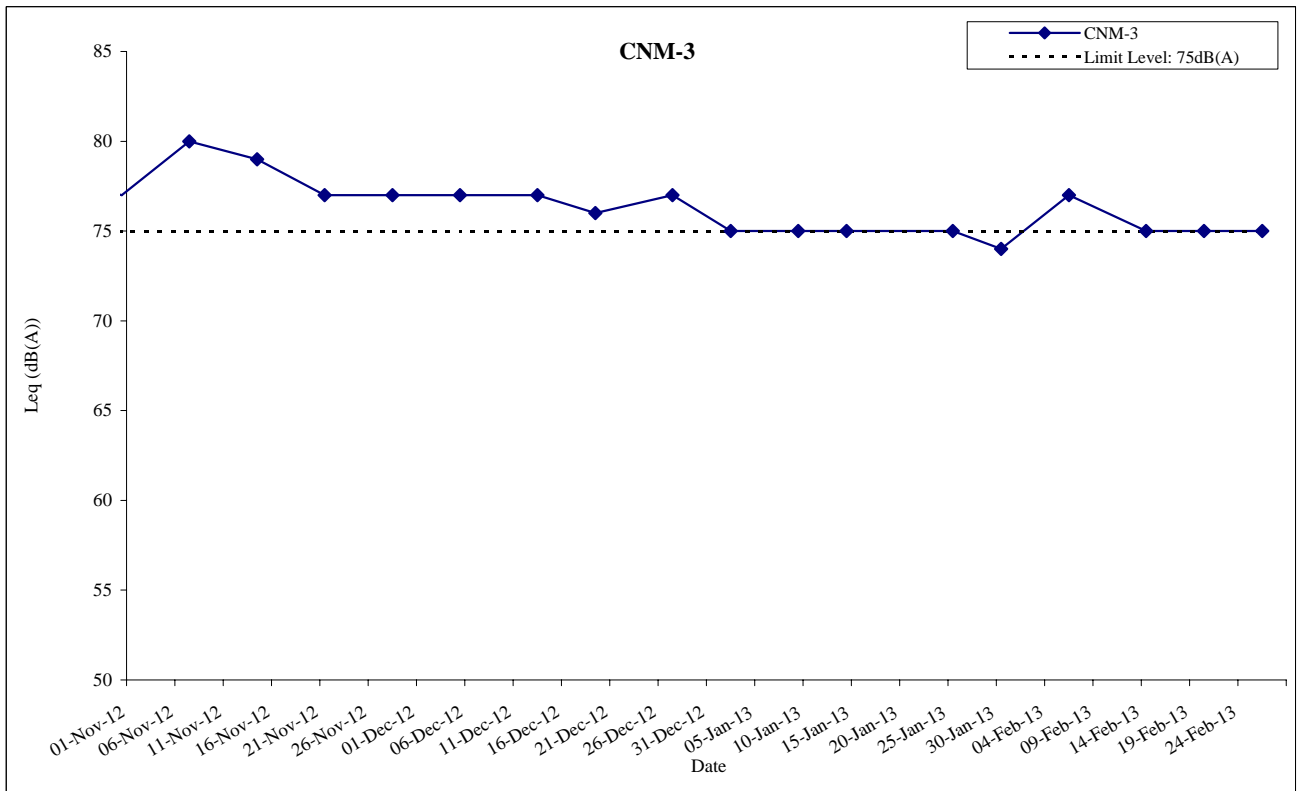
Graphical Presentation of Noise Monitoring Results for Locations CNM-1 and CNM-2

Date

Feb-13

APPENDIX

F



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

Feb-13

APPENDIX

F

Appendix G
Meteorological Data

**EXTRACT OF METEOROLOGICAL OBSERVATIONS FOR HONG KONG,
FEBRUARY 2013 (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 | 1020.1 | 24.9 | 20.7 | 17.4 | 15.7 | 73 | 32 | - |
| 2 | 1019.8 | 26.0 | 21.1 | 18.9 | 16.1 | 74 | 63 | - |
| 3 | 1018.9 | 19.7 | 18.9 | 18.2 | 15.8 | 82 | 85 | Trace |
| 4 | 1018.5 | 23.3 | 21.2 | 19.1 | 18.5 | 85 | 88 | Trace |
| 5 | 1017.5 | 25.2 | 22.1 | 20.3 | 20.0 | 88 | 82 | Trace |
| 6 | 1015.9 | 24.6 | 21.3 | 19.3 | 19.0 | 87 | 81 | Trace |
| 7 | 1014.3 | 20.6 | 19.1 | 18.1 | 17.0 | 87 | 88 | Trace |
| 8 | 1019.3 | 18.7 | 16.4 | 14.4 | 14.0 | 86 | 88 | 0.2 |
| 9 | 1022.6 | 15.8 | 14.1 | 11.9 | 9.3 | 73 | 88 | Trace |
| 10 | 1020.6 | 18.3 | 15.9 | 14.0 | 12.1 | 79 | 87 | Trace |
| 11 | 1020.0 | 19.6 | 17.2 | 16.0 | 13.8 | 80 | 70 | Trace |
| 12 | 1020.0 | 22.8 | 19.0 | 16.3 | 13.9 | 73 | 57 | Trace |
| 13 | 1020.0 | 20.8 | 17.4 | 15.6 | 11.9 | 71 | 60 | Trace |
| 14 | 1017.3 | 21.2 | 18.5 | 16.7 | 14.4 | 77 | 84 | Trace |
| 15 | 1016.9 | 24.4 | 20.8 | 18.0 | 16.5 | 77 | 85 | 0.5 |
| 16 | 1019.1 | 19.4 | 17.3 | 16.2 | 14.1 | 82 | 82 | 0.1 |
| 17 | 1015.6 | 21.0 | 18.2 | 16.5 | 14.6 | 79 | 71 | - |
| 18 | 1013.1 | 25.4 | 21.1 | 18.5 | 18.3 | 84 | 79 | - |
| 19 | 1014.5 | 26.2 | 20.9 | 17.8 | 18.4 | 86 | 67 | Trace |
| 20 | 1019.9 | 19.0 | 17.3 | 16.0 | 13.4 | 78 | 88 | Trace |
| 21 | 1020.4 | 21.4 | 17.7 | 16.4 | 14.1 | 79 | 58 | Trace |
| 22 | 1021.5 | 22.4 | 19.1 | 16.2 | 14.0 | 73 | 62 | - |

| 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) | | | | |
| 23 | 1023.1 | 21.8 | 18.0 | 16.2 | 12.9 | 72 | 54 | - |
| 24 | 1020.9 | 20.8 | 18.0 | 16.3 | 13.2 | 73 | 84 | Trace |
| 25 | 1018.9 | 23.1 | 19.6 | 17.3 | 14.2 | 71 | 79 | - |
| 26 | 1016.2 | 23.8 | 21.3 | 19.1 | 18.1 | 82 | 88 | 0.2 |
| 27 | 1014.0 | 25.4 | 22.7 | 21.0 | 19.6 | 83 | 72 | Trace |
| 28 | 1013.8 | 21.9 | 19.0 | 18.3 | 17.5 | 91 | 88 | 0.5 |
| Mean/Total | 1018.3 | 22.1 | 19.1 | 17.1 | 15.4 | 80 | 75 | 1.5 |
| 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 2013 (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 | 8.5 | 17.51 | 2.7 | 020 | 14.5 |
| 2 | 4 | 6.4 | 14.83 | 3.9 | 050 | 20.5 |
| 3 | 0 | 0.2 | 6.72 | 1.9 | 080 | 31.9 |
| 4 | 2 | 0.3 | 6.91 | 0.8 | 050 | 11.6 |
| 5 | 4 | 4.8 | 13.50 | 2.6 | 050 | 16.4 |
| 6 | 2 | 4.2 | 12.05 | 2.9 | 050 | 17.0 |
| 7 | 5 | 1.5 | 11.17 | 3.0 | 070 | 31.0 |
| 8 | 0 | - | 4.71 | 1.8 | 080 | 42.8 |

| 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) |
|--------------------------|---|--|--|---------------------------------------|--|---|
| 9 | 0 | 0.1 | 7.26 | 2.1 | 030 | 22.5 |
| 10 | 6 | 0.1 | 6.06 | 1.5 | 040 | 18.7 |
| 11 | 0 | 6.8 | 17.29 | 3.5 | 090 | 32.0 |
| 12 | 2 | 7.5 | 15.87 | 3.7 | 020 | 17.1 |
| 13 | 0 | 6.5 | 15.38 | 3.2 | 020 | 21.0 |
| 14 | 0 | 2.1 | 10.60 | 2.1 | 060 | 19.4 |
| 15 | 6 | 5.3 | 14.77 | 3.1 | 070 | 14.2 |
| 16 | 0 | 4.3 | 10.22 | 2.5 | 080 | 37.2 |
| 17 | 7 | 2.0 | 8.38 | 1.8 | 060 | 22.1 |
| 18 | 5 | 3.8 | 12.08 | 1.9 | 040 | 8.4 |
| 19 | 2 | 6.9 | 17.42 | 4.1 | 040 | 14.5 |
| 20 | 0 | 0.2 | 6.94 | 2.4 | 080 | 34.0 |
| 21 | 3 | 4.7 | 12.10 | 2.2 | 080 | 27.1 |
| 22 | 11 | 5.8 | 15.34 | 3.0 | 080 | 18.0 |
| 23 | 0 | 7.9 | 18.15 | 4.4 | 080 | 29.8 |
| 24 | 3 | 0.4 | 7.22 | 2.2 | 070 | 33.2 |
| 25 | 0 | 2.5 | 12.65 | 2.6 | 050 | 24.6 |
| 26 | 0 | 0.5 | 10.52 | 1.8 | 050 | 18.4 |
| 27 | 3 | 5.4 | 13.33 | 2.7 | 030 | 6.7 |
| 28 | 2 | - | 3.41 | 0.7 | 050 | 26.9 |
| Mean/Total | 67 | 98.7 | 11.51 | 71.1 | 070 | 22.6 |
| Normal* | 143.8 § | 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 1011.3 hectopascals at 1503 HKT on 18 February.

The maximum air temperature recorded at the Hong Kong Observatory was 26.2 degrees C at 1319 HKT on 19 February.

The minimum air temperature recorded at the Hong Kong Observatory was 11.9 degrees C at 0635 HKT on 9 February.

The maximum gust peak speed recorded at Waglan Island was 68 kilometres per hour from 090 degrees at 0331 HKT on 8 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.

* 1981 - 2010 Climatological Normal, unless otherwise specified

§ 1997-2011 Mean value

Appendix H

Calibration Certificates of SLM

Certificate of Calibration

校正證書

Certificate No. : C130538

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0067)

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 : $(23 \pm 2)^{\circ}\text{C}$ Relative Humidity / 相對濕度 : $(55 \pm 20)\%$
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 24 January 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 : 
測試 : K C Lee

Certified By : 
核證 : C C Cheung

Date of Issue : 24 January 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. : C130538

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 | DC110233 |

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 | 93.9 |

- 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書面批准。

Certificate of Calibration

校正證書

Certificate No. : C130538

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. : C130538
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 : ± 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.

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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 香港新界屯門與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



輝
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輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

Certificate of Calibration

校正證書

Certificate No. : C130641

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0067)

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 2013

TEST RESULTS / 測試結果

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

All results are within manufacturer's specification.

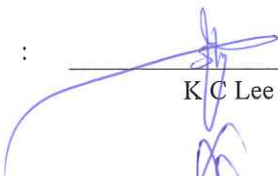
The results are detailed in the subsequent page(s).

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

測試

: 
K C Lee

Certified By

核證

: 
C C Cheung

Date of Issue

簽發日期

: 28 January 2013

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. : C130641

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 :

| Equipment ID | Description | Certificate No. |
|--------------|-------------------------------------|-----------------|
| CL280 | 40 MHz Arbitrary Waveform Generator | C130019 |
| CL281 | Multifunction Acoustic Calibrator | DC110233 |

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 | 93.9 |

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書面批准。

Certificate of Calibration

校正證書

Certificate No. : C130641

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. : C130641
證書編號

- 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.

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Certificate of Calibration 校正證書

Certificate No. : C130439
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0067)

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 : $(23 \pm 2)^\circ\text{C}$ Relative Humidity / 相對濕度 : $(55 \pm 20)\%$
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 19 January 2013

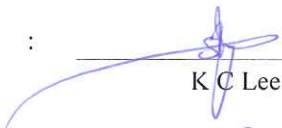
TEST RESULTS / 測試結果

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
- Agilent Technologies, USA
- Fluke Everett Service Center, USA
- Rohde & Schwarz Laboratory, Germany

Tested By
測試


K C Lee

Certified By
核證


C C Cheung

Date of Issue : 21 January 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書面批准。

Certificate of Calibration

校正證書

Certificate No. : C130439

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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 | DC110233 |

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 | 94.1 |

- 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.

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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 | 90.8 | -3.2 ± 1.4 |
| | | | 1 kHz | 94.0 | Ref. |
| | | | 2 kHz | 95.2 | $+1.2 \pm 1.6$ |
| | | | 4 kHz | 94.9 | $+1.0 \pm 1.6$ |
| | | | 8 kHz | 92.5 | $-1.1(+2.1 ; -3.1)$ |
| | | | 12.5 kHz | 89.5 | $-4.3(+3.0 ; -6.0)$ |

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 | 90.7 | $-3.0(+2.1 ; -3.1)$ |
| | | | 12.5 kHz | 87.5 | $-6.2(+3.0 ; -6.0)$ |

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Sun Creation Engineering Limited – Calibration & Testing Laboratory

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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

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Certificate of Calibration

校正證書

Certificate No. : C130439
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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 : ± 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.

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