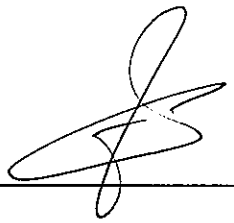
MTR Corporation Limited

West Island Line Project

Baseline Monitoring Report (Part 15)
Rev B

Verified by: 

Position: Independent Environmental Checker

Date: 8 December 2011

MTR Corporation Limited

West Island Line Project

Baseline Monitoring Report (Part 15)
Rev B

Certified by: _____

Position: Environmental Team Leader

Date: 6 December 2011

EXECUTIVE SUMMARY

Background

MTR Corporation Limited (MTRCL) proposes to build a new railway line, the West Island Line (WIL) which is an extension of the Island Line to the Western District. The route length of the fully underground WIL is approximately 3 km with three new underground stations namely Sai Ying Pun Station (SYP), University Station (UNI) and Kennedy Town Station (KET).

Impact Assessment and Baseline Monitoring

With the development of the Environmental Monitoring and Audit Manual (EM&A Manual) in accordance with the guideline set out in the Environmental Impact Assessment (EIA) report prepared by ENSR Asia (HK) Limited in October 2008, Baseline Monitoring (Part 15) have been conducted for both dust and noise at the proposed monitoring locations in the vicinity of Works Area M3 to establish baseline levels for both dust and noise for the civil construction work within Works Area M3.

Results and Conclusions

Baseline monitoring (Part 15) had been carried out in accordance with the recommendations contained in the Technical Memoranda associated with EIAO, Air Pollution Control Ordinance and Noise Control Ordinance, where applicable. Results and Conclusions of the report were presented in the subsequent sections of the Baseline Monitoring Report.

1 INTRODUCTION

1.1 BACKGROUND

The West Island Line Project

MTR Corporation Limited (MTRCL) proposes to build a new railway line, the West Island Line (WIL) which is an extension of the Island Line to the Western District. The route length of the fully underground WIL is approximately 3 km with three new underground stations namely Sai Ying Pun (SYP), University (UNI) and Kennedy Town (KET).

The location of works areas is shown in Figure 1.

1.1.1 An EIA study (refer to EIA Report dated October 2008) has been conducted by ENSR Asia (HK) Limited for the proposed WIL Project. An EM&A Manual has provided guidelines in the preparation of this baseline monitoring report.

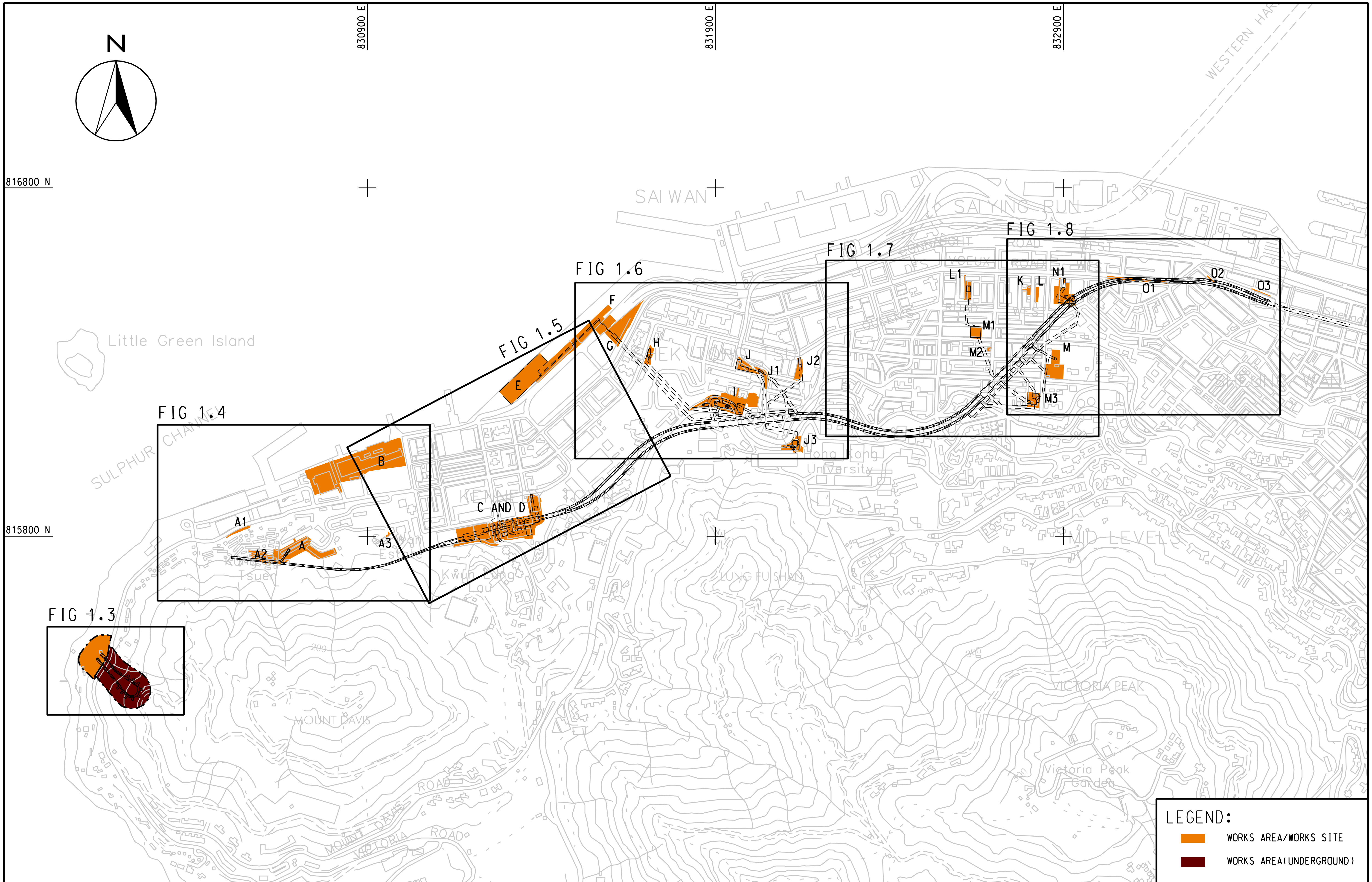
1.1.2 Baseline levels have been established for both dust and noise, by which the performance of the construction Contractor may be measured in meeting the required environmental protection standards and requirements under the Environmental Permit, during the course of the construction work. These are presented in subsequent sections of this report.

1.1.3 This Baseline Monitoring Report (Part 15) which is the last batch of baseline monitoring report for the WIL Project presents the results for the baseline monitorings conducted for both dust and noise at the proposed monitoring locations in the vicinity of Works Area M3 and establishes baseline levels for both dust and noise for the civil construction work within Works Area M3. It should be noted that noise baseline monitoring for CN10 for Works Area J1 would not be conducted as the vent shaft originally located at Works Area J1 was deleted.

1.2 ORGANISATION OF THE REPORT

Following the introduction, the remainder of this Report is arranged as follows:

- Section 2 describes the air quality monitoring methodology and analyses the monitoring results;
- Section 3 describes the noise quality monitoring methodology and analyses the monitoring results.
- Section 4 Conclusions



AECOM

WEST ISLAND LINE
ENVIRONMENTAL REPORT FOR VARIATION OF ENVIRONMENTAL PERMIT APPLICATION (EP-313/2008)

MAJOR GROUND LEVEL WORKS AREAS/ WORKS SITES - KEY PLAN

SCALE	A3 1:10000	DATE	JUN. 09
CHECK	FWYW	DRAWN	WDF
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p:\projects\60017115\DRAWING\FIGURE\VARIATION\FIG 1.2.dgn

2 AIR QUALITY

2.1 MONITORING METHODOLOGY

Monitoring and sampling analysis were undertaken by the Environmental Team to establish baseline levels for both 1-hour and 24-hour Total Suspended Particulates (TSP) in the vicinity of the major works areas along WIL, namely the construction sites for stations/entrances and associated structures. This provides data against which any environmental impacts due to construction activities can be compared. During the construction period impact monitoring will only be conducted for 24-hour TSP, although 1-hour TSP monitoring may also be conducted and used in following up on complaints or exceedances, in order to provide a more rapid indication of the source of the problem at hand.

Baseline monitoring station (AM8) as specified in the EM&A Manual for both 1-hour and 24-hour TSP measurements has been established at Bon-Point, see figure 6.

Three separate 1-hour TSP measurements daily for a period of at least 14 days were made at the monitoring station to establish the ambient 1-hour TSP levels.

24-hour TSP measurements by real time particulate monitor were carried out over a period of at least 14 days at the monitoring station to establish the ambient 24-hour TSP levels.

Initially, as the building management of Bon-Point refused the installation of High Volume Sampler at the podium level for the 24-hour TSP measurements to avoid noise impact to the residents of the premise as a result of the 24 hour operation of the HVS, the 24-hour TSP levels were measured by real time particulate monitor.

For the baseline monitoring for Works Area M3 conducted at Monitoring Station AM8 in March/April 2011 before commencement of construction works, 1-hour and 24-hour TSP levels were measured by real time particulate monitor (MIE ADR-1500). The real time particulate monitor by Thermo Fisher Scientific is an updated version of the MIE-DataRam previously used for 1-hour TSP measurements for the WIL Project.

Upon further liaison with the building management, a suitable location had been identified on the roof of the small structure at podium level with roof architectural features for the 24-hour TSP measurements using High Volume Sampler which assures minimal disturbance to the occupants during monitoring. The relocated monitoring station is about 5m from the original monitoring station and one storey higher than the podium level. The three criteria for alternative monitoring location as stated in S. 9.13 of the Approved EM&A Manual are complied with. As such, 24-hour samples can be collected by High Volume Sampler (Graseby-Andersen) following United States

Environmental Protection Agency regulations and 1-hour TSP levels are measured by real time particulate monitor (MIE ADR-1500).

As construction works at Works Area M3 has been commenced in July 2011 and it is not feasible to carry out another air baseline monitoring at Monitoring Station AM8 using High Volume Sampler for another 2 consecutive weeks. A baseline checking on 3 consecutive Sundays at Monitoring Station AM8 using High Volume Sampler is proposed to be conducted when there are no construction works or dust generating activities in the vicinity of the air monitoring station to collect data to demonstrate that the baseline levels obtained by the High Volume Sampler are similar to those obtained by the real time particulate monitor (MIE ADR-1500) for the 24-hour TSP baseline monitoring.

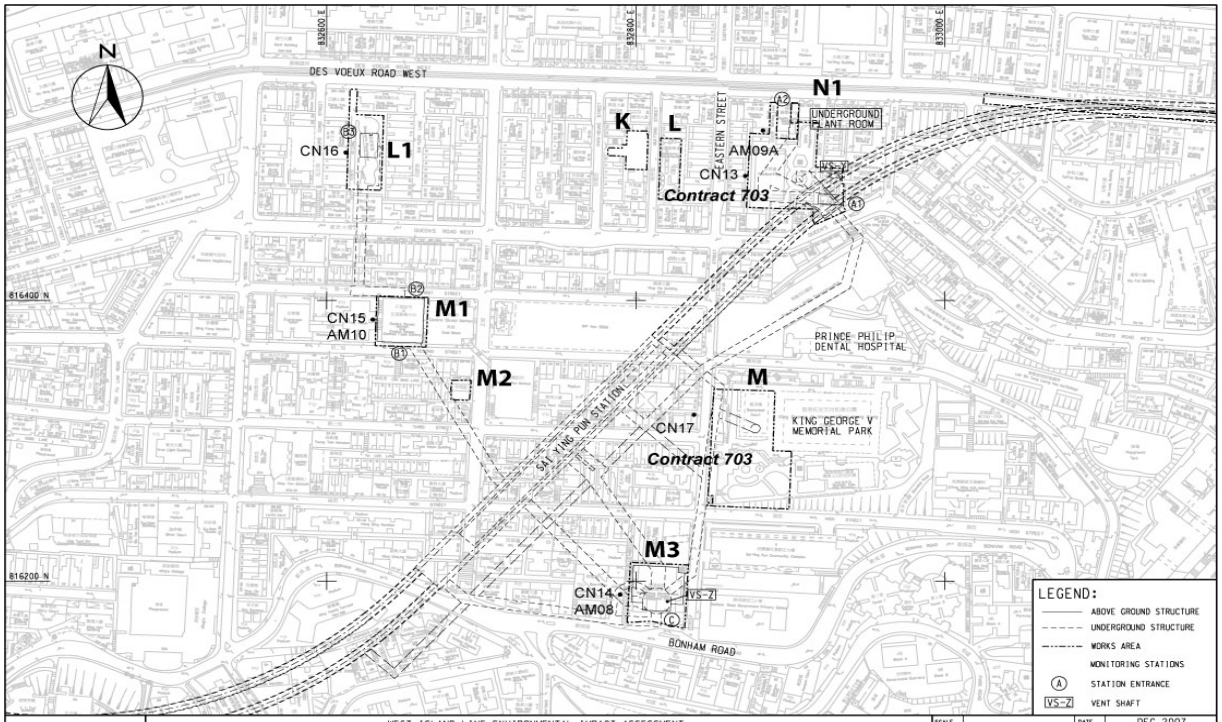
High Volume Sampler is to be used for the regular 24-hour TSP measurements at Monitoring Station AM8 except additional 1-hr monitoring for complaint case.

2.2 CALIBRATION REQUIREMENTS

The flow rate of the high volume sampler with mass flow controller will be calibrated using an orifice calibrator. Initial calibration (five points) will be conducted upon installation and prior to commissioning. Calibration will be carried out every six months by Science International Corporation. Calibration certificate is attached in Annex C.

The sensing system of MIE is calibrated by clean filtered air passing through the flow-sensing system, providing a controlled check of the zero-concentration condition. Calibration of the MIE by manufacturer shall be carried out every year by Thermo Fisher Scientific and properly documented. Calibration certificate is attached in Annex C.

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.



WEST ISLAND LINE ENVIRONMENTAL IMPACT ASSESSMENT

LOCATIONS OF MONITORING STATIONS (CONSTRUCTION PHASE)

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DRAWING No.	FIG 6
REV	–

2.3 MONITORING PROCEDURES

1-Hour TSP Levels Monitoring

TSP is sampled by drawing air into the MIE where particulate concentrations are measured instantaneously with an in-built silicon detector sensing light scattered by the particles in the sampled air (optical sensing stage). Continuous TSP levels are indicated on the MIE along with a 'Time Weighted Average' value.

24-Hour TSP Levels Monitoring

The sampling procedure follows to that described in the App. B of Pt 50 in 40CFR Ch.1 (U.S. Environmental Protection Agency). 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 the laboratory for drying in a desiccator 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.

2.4 MONITORING RESULTS

2.4.1 1-Hour TSP baseline monitoring was conducted at the monitoring station between 21 March 2011 and 3 April 2011. The average 1-hour TSP baseline levels have been established from the baseline data listed in *Annex A*, and are shown in *Table 2.4a* below.

Weather conditions throughout the monitoring period were mild and relatively dry, with light wind normally from the northeast for the majority of the time, with some days from the east. The average measured wind speed during the baseline monitoring was in the range 1.6 – 3.5m/s.

Table 2.4a 1-hour TSP Baseline Level

Monitoring Location	Average 1-h TSP Level ($\mu g/m^3$)
Bon-Point (AM8)	69

Note: TSP levels are to the nearest whole number, with values of 0.5 rounded up

It was noted that there was no construction work with dust generating activities in the vicinity as well as in Works Area M3 during the monitoring period. Road traffic was observed around the area along Eastern Street and Bonham Road. The dust particulates generated from the exhaust fumes from the road traffic around the area contribute to the background TSP levels.

Action and Limit Levels

To provide an early indication of any deterioration in the Contractor's environmental performance, action levels were derived based on the measured baseline levels. Limit level is set at 500μg/m^3 for the 1-hour TSP level as recommended for consideration in the EIAO-TM.

For 1-hour TSP the action level for baseline smaller than or equal to 384μg/m^3 is the average of 130% of the baseline and the limit level. For baseline greater than 384μg/m^3 the action level is 500μg/m^3. The derived level for the monitoring station is shown in *Table 2.4b* below.

Table 2.4b Baseline, Action and Limit Levels for 1-hour TSP

Monitoring Location	Baseline Level (μg/m3)	Action Level (μg/m3)	Limit Level (μg/m3)
Bon-Point (AM8)	69	295	500[(1)]

(1) - 1-hour TSP criterion recommended in the EIAO-TM
Note: TSP levels are to the nearest whole number, with values of 0.5 rounded up

This baseline level can be expected to vary throughout the year, particularly with the weather changes between the wet and dry season, and changes in other construction works in the locality.

It is therefore recommended that baseline level be checked every six months, preferably when there are no MTRCL construction activities ongoing in the vicinity.

2.4.2 24-hour TSP

Initial Baseline Monitoring

24-hour TSP baseline monitoring was conducted at the podium of Bon-Point between 21 March 2011 and 3 April 2011 by using real time particulate monitor.

Weather conditions throughout 24hour-TSP monitoring period were mild and relatively dry, with light wind normally from the northeast for the majority of the time, with some days from the east. The average measured wind speed during the baseline monitoring was in the range 1.6 – 3.5m/s.

The averaged 24-hour TSP baseline level has been established from the baseline data listed in *Annex A*, and are shown in *Table 2.4c* below.

Table 2.4c 24-hour TSP Baseline Levels

Monitoring Location	**Average 24-h TSP Level (μg/m^3)**
Bon-Point (AM8)	78

Note: TSP levels are to the nearest whole number, with values of 0.5 rounded up

It was noted that there was no construction work with dust generating activities in the vicinity as well as in Works Area M3 during the monitoring period. Road traffic was observed around the area along Eastern Street and Bonham Road. The dust particulates generated from the exhaust fumes from the road traffic around the area contribute to the background TSP levels.

Baseline Checking

Since there are changes in monitoring methodology and monitoring location, a baseline checking was conducted to ensure the adequacy of the previous measured baseline level as shown in Table 2.4c above. Baseline checking results conducted on 3 consecutive Sundays at the relocated monitoring station AM8 at Bon-Point as mentioned in Section 2.1 7th paragraph above by HVS when there were no construction or dust generating activities in the vicinity of the monitoring station are as follows:-

Date	Baseline Value (ug/m3)
18/09/2011	67.7
25/09/2011	80.3
02/10/2011	61.9

The average baseline value is 70.0 ug/m3 and there is no significant difference from the 24-hour TSP value of 78 ug/m3 for the initial baseline monitoring. From the above result, it can be demonstrated that the baseline value obtained during the initial baseline monitoring and the baseline checking are similar. The baseline value of 70.0 ug/m3 can be used as the 24-hour TSP baseline level for monitoring station AM8 at Bon-Point. Similarly, the original baseline value of 69 ug/m3 can be used as the 1-hour TSP baseline level for monitoring station AM8 at Bon-Point as mentioned in Section 2.4.1.

Action and Limit Levels

To provide an early indication of any deterioration in the Contractor's environmental performance, action levels were derived based on the measured baseline levels. The Air Quality Objective limit level for 24-hour TSP is set at 260μg/m^3.

For 24-hour TSP the action level for baseline smaller than or equal to 200μg/m^3 is the average of 130% of the baseline and the limit level. For baseline greater than 200μg/m^3 the action level is 260μg/m^3. The derived levels for each monitoring station are shown in *Table 2.4d* below.

Table 2.4d Baseline, Action and Limit Levels for 24-hour TSP

Monitoring Location	**Baseline Level (μg/m^3)**	**Action Level (μg/m^3)**	**Limit Level (μg/m^3)**
Bon-Point (AM8)	70	176	260

Note: TSP levels are to the nearest whole number, with values of 0.5 rounded up

This baseline level can be expected to vary throughout the year, particularly with the weather changes between the wet and dry season, and changes in other construction works in the locality.

It is therefore recommended that baseline level be checked every six months, preferably when there are no MTRC construction activities ongoing in the vicinity.

3 NOISE

3.1 MONITORING METHODOLOGY

Monitoring was undertaken by the Environmental Team to establish noise baseline levels in the vicinity of the Works Area M1, to provide data against which any environmental impacts due to construction activities can be compared.

The baseline monitoring station as specified in the EM&A Manual were established at the following location, see Figure 6:

CN14 - Bon-Point

Consecutive noise measurements were undertaken over a period of at least 14 days to establish the ambient noise levels at representative nearest sensitive receivers. Continuous 5 minute A-weighted noise levels were recorded throughout the daytime, evening and night-time on weekdays (Monday to Saturday) and also on Sundays. The noise levels were presented for weekdays over each 30 minute period between 0700 and 1900hr to produce the baseline conditions.

Monitoring was conducted using B&K sound analysis equipment – B&K SLM 2236. Microphones were extended 1.2 metres from building facades and oriented towards the works area.

Weather conditions throughout the monitoring period were mild and relatively dry, with light wind normally from the northeast, with some days from the east. The average measured wind speed during the baseline monitoring was in the range 1.6 – 3.5m/s.

3.2 CALIBRATION REQUIREMENTS

B&K 2236 sound level meters which complied with the International Electrotechnical Commission Publication 651:1979 (Type 1) and 804:1985 (Type 1), specification as referred to in the Technical Memoranda to the NCO were used for the baseline monitoring. The B&K sound level meters and B&K 4231 calibrator are verified by the certified laboratory or manufacturer once every two years by MaxLab Calibration Centre Limited to ensure they perform to the same level of accuracy as stated in the manufacturer's specifications. Calibration certificates are attached in Annex C.

Immediately prior to and following each set of measurements at any NSR, the accuracy of the sound level meter was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. If the calibration levels before and after the measurement differ by more than 1.0dB the measurement shall be repeated to obtain a reliable result (note: maximum deviation during this initial baseline monitoring period was 0.3dB). Periods of prolonged or repeated overloading of the sound level meter detector were avoided by setting the meter with adequate headroom prior to commencing measurements. Measurements were recorded to the nearest 0.1 dB, with values of 0.05 being rounded up.

Limit levels for these locations are shown in *Table 3.3 a*.

Table 3.3a Limit Levels for Construction Noise

Time Period	**Noise Level (dB) for NSR around Works Area M3**
Daytime (0700-1900), Monday through Saturday excluding Public Holidays	$L_{Aeq\ 30mins}75$[(1)]
All evenings (1900-2300)	Subject to control under the Noise Control Ordinance
General Holidays (including all Sundays) during the daytime and evening (0700-2300)	Subject to control under the Noise Control Ordinance
All night time periods (2300-0700)	Subject to control under the Noise Control Ordinance

(1) Limit level guideline, for educational establishments the limit level shall be 70, reduced to 65 during examination periods.

3.3 MONITORING RESULTS

Noise baseline monitoring was conducted at the monitoring station CN14 between 21 March 2011 and 3 April 2011.

5 minute, "fast" detector response, levels were recorded in the following indices, L_{Aeq}, L_{A10}, L_{A90}. The baseline data was initially downloaded into a spreadsheet, directly from the noise loggers in ASCII format for checking, and then imported into the database. The L_{Aeq}, results for each 5 minute period of weekday were averaged. An average of two 24 hour Sunday periods was covered in the monitoring periods. 'Time Slot Averaged', 'Noise Control Period Averaged' baseline noise levels are presented for the monitoring location in *Annex B.*

At the monitoring station CN14, it was observed that the ambient noise and the vehicular traffic along Eastern Street and Bonham Road contributed to the background noise.

4 CONCLUSION

4.1 BASELINE LEVEL

4.1.1 Air

1-hour TSP

1-hour TSP baseline monitoring was conducted at the monitoring station at Bon-Point (AM8) between 21 March 2011 and 3 April 2011. Baseline TSP levels were recorded in the range of 28 $\mu g/m^3$ and 112 $\mu g/m^3$.

24-hour TSP

24-hour TSP baseline monitoring by real time particulate monitor was conducted at the podium of Bon-Point (AM8) between 21 March 2011 and 3 April 2011. Baseline TSP levels between 38 $\mu g/m^3$ and 123 $\mu g/m^3$ had been recorded. Baseline checking by HVS was conducted at the relocated monitoring station AM8 at Bon-Point as mentioned in Section 2.1 7th paragraph above on 18/09/2011, 25/09/2011 and 02/10/2011. Baseline TSP levels between 61.9 $\mu g/m^3$ and 80.3 $\mu g/m^3$ had been recorded.

4.1.2 Noise

Baseline monitorings were conducted at the monitoring station at Bon-Point (CN14) from 21 March 2011 to 3 April 2011. Baseline noise levels have been established for weekday and Sunday periods.

Baseline noise levels between 59.0 and 66.6 dB(A) had been recorded at the monitoring station CN14 from 0700 – 1900hr for the monitoring station.

The noise sources noticed at the monitoring station CN14 were the vehicular traffic along Eastern Street and Bonham Road in the vicinity.

4.2 ACTION AND TARGET LEVELS

4.2.1 Air

1-hour TSP

The 1-hour TSP action level have been calculated from baseline levels and presented in Table 2.4b. Limit level is set at 500 $\mu g/m^3$ for the 1-hour TSP limit suggested in the EIAO-TM. The 1-hour TSP monitoring is intended to use in following up on complaints or exceedances, in order to provide a more rapid indication of the source of the problem at hand.

24-hour TSP

24-hour TSP action levels have been calculated from baseline levels and are presented in Table 2.4d. The Air Quality Objective limit level for 24-hour TSP is set at 260 $\mu g/m^3$.

4.2.2 Noise

Action level exceedance occurs when one or more documented complaints are received.

Limit level is set at $L_{Aeq\ 30mins}75$[(1)] for normal working hours (i.e. 0700 – 1900 hours on any day not being a Sunday or general holiday), as suggested in EIAO-TM and the Practice Note for Professional Persons ProPECC PN2/93. For restricted hours (i.e. 1900 – 0700 hours for weekdays and all day on Sundays and general holidays), limit level shall be subjected to control under the Noise Control Ordinance (NCO).

[(1)]Limit level guideline, for educational establishments the limit level shall be 70, reduced to 65 during examination periods.

ANNEX A

TSP Baseline Measurements

Project: West Island Line
Report for Location: Bon Point (AM8)
Samples between: 21/03/2011 and 03/04/2011

Report Date 05/07/2011

Sample Code	Date	Start Time	Parameter	Value	Unit
AM8/001	21/03/2011	13:00	Total Suspended Particulate (1 hr)	61.8	µg/cu.m
AM8/002	22/03/2011	13:00	Total Suspended Particulate (1 hr)	106.8	µg/cu.m
AM8/003	23/03/2011	13:00	Total Suspended Particulate (1 hr)	106.4	µg/cu.m
AM8/004	24/03/2011	13:00	Total Suspended Particulate (1 hr)	56.5	µg/cu.m
AM8/005	25/03/2011	13:00	Total Suspended Particulate (1 hr)	57.6	µg/cu.m
AM8/006	26/03/2011	13:00	Total Suspended Particulate (1 hr)	72.9	µg/cu.m
AM8/007	27/03/2011	13:00	Total Suspended Particulate (1 hr)	62.3	µg/cu.m
AM8/008	28/03/2011	13:00	Total Suspended Particulate (1 hr)	67.5	µg/cu.m
AM8/009	29/03/2011	13:00	Total Suspended Particulate (1 hr)	57.5	µg/cu.m
AM8/010	30/03/2011	13:00	Total Suspended Particulate (1 hr)	27.8	µg/cu.m
AM8/011	31/03/2011	13:00	Total Suspended Particulate (1 hr)	58.0	µg/cu.m
AM8/012	01/04/2011	13:00	Total Suspended Particulate (1 hr)	112.4	µg/cu.m
AM8/013	02/04/2011	13:00	Total Suspended Particulate (1 hr)	65.2	µg/cu.m
AM8/014	03/04/2011	13:00	Total Suspended Particulate (1 hr)	48.8	µg/cu.m

Note: The figures are the average of 3 separate 1-hour TSP measurements obtained daily

Project: West Island Line
Report for Location: Bon Point (AM8)
Samples between: 21/03/2011 and 03/04/2011

Report Date 05/07/2011

Sample Code	Date	Parameter	Value	Unit
AM8/001	21/03/2011	Total Suspended Particulate (24 hr)	114.3	µg/cu.m
AM8/002	22/03/2011	Total Suspended Particulate (24 hr)	122.7	µg/cu.m
AM8/003	23/03/2011	Total Suspended Particulate (24 hr)	101.7	µg/cu.m
AM8/004	24/03/2011	Total Suspended Particulate (24 hr)	72.1	µg/cu.m
AM8/005	25/03/2011	Total Suspended Particulate (24 hr)	57.0	µg/cu.m
AM8/006	26/03/2011	Total Suspended Particulate (24 hr)	72.7	µg/cu.m
AM8/007	27/03/2011	Total Suspended Particulate (24 hr)	76.0	µg/cu.m
AM8/008	28/03/2011	Total Suspended Particulate (24 hr)	81.7	µg/cu.m
AM8/009	29/03/2011	Total Suspended Particulate (24 hr)	60.0	µg/cu.m
AM8/010	30/03/2011	Total Suspended Particulate (24 hr)	37.9	µg/cu.m
AM8/011	31/03/2011	Total Suspended Particulate (24 hr)	50.9	µg/cu.m
AM8/012	01/04/2011	Total Suspended Particulate (24 hr)	92.6	µg/cu.m
AM8/013	02/04/2011	Total Suspended Particulate (24 hr)	82.2	µg/cu.m
AM8/014	03/04/2011	Total Suspended Particulate (24 hr)	66.3	µg/cu.m

Note: 1. The air sampler is operated in constant flow rate

ANNEX B

Noise Baseline Measurements

Noise Baseline Report

Project: West Island Line
Report for Location: Bon-Point (CN14)
Baseline between: 21/03/2011 - 03/04/2011

Report date: 05/07/2011

Parameter : Leq

Time Slot Averaged Baselines
Weekdays Noise Level, dB(A)

	LAeq,30min	L10	L90
07:00-07:30	59.3	61.4	55.4
07:30-08:00	60.0	62.1	56.9
08:00-08:30	60.5	62.1	57.9
08:30-09:00	61.6	62.9	59.0
09:00-09:30	62.4	64.0	59.8
09:30-10:00	65.3	67.9	61.3
10:00-10:30	66.2	69.1	61.7
10:30-11:00	65.5	68.1	61.1
11:00-11:30	65.0	67.4	61.1
11:30-12:00	63.3	65.6	60.0
12:00-12:30	61.4	63.3	58.2
12:30-13:00	61.9	63.5	57.9
13:00-13:30	63.3	65.8	59.6
13:30-14:00	65.0	67.7	60.5
14:00-14:30	64.5	67.2	60.2
14:30-15:00	64.3	66.9	60.2
15:00-15:30	64.5	66.9	60.6
15:30-16:00	62.6	64.3	60.0
16:00-16:30	65.3	68.3	60.5
16:30-17:00	66.6	69.8	60.1
17:00-17:30	65.7	69.7	59.5
17:30-18:00	61.6	63.3	59.0
18:00-18:30	59.7	61.6	56.8
18:30-19:00	59.0	61.0	55.9

Noise Control Period Averaged Baselines
Weekdays Noise Level, dB(A)

	LAeq,30min	L10	L90
07:00-19:00	63.7	66.3	59.6

	LAeq,5min	L10	L90
19:00-23:00	57.7	60.0	53.7
23:00-07:00	52.7	54.8	49.2

Sundays/General Holidays Noise Level, dB(A)

	LAeq,5min	L10	L90
07:00-19:00	57.8	59.8	54.3
19:00-23:00	57.4	59.8	52.7
23:00-07:00	53.0	55.4	49.2

Logarithmic Averaging is being used.

ANNEX C

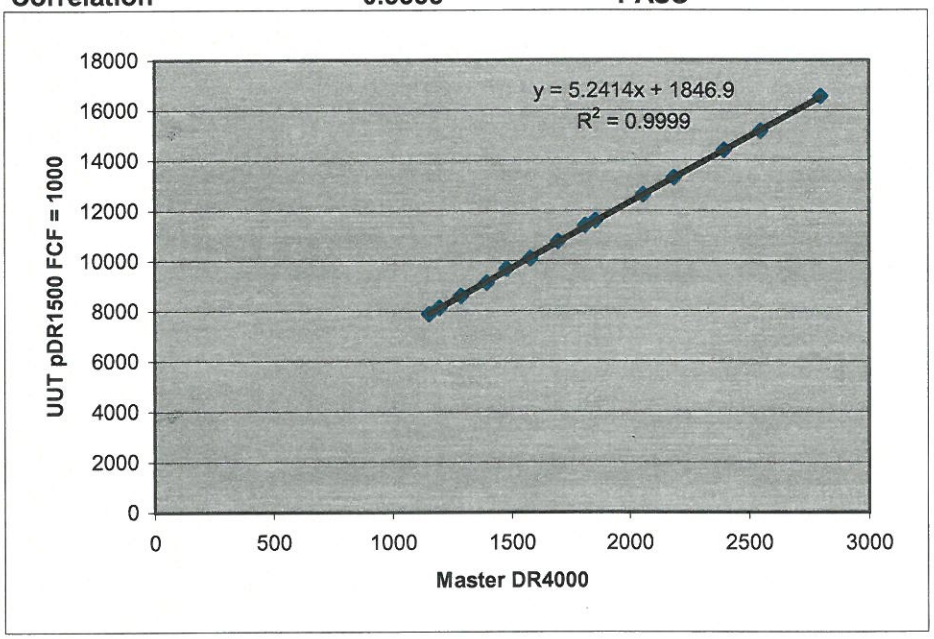
Calibration Certificates for Monitoring Equipment

Calibration Certificate for Real Time Dust Monitor

Thermo
SCIENTIFIC

Model ADR-1500 Calibration

Calibration Technician	***Bill Davidge***
Date	***3/3/2011***
S/N:	***1030945316***
Calibration Due:	***3/3/2012***
Leak Check @ 10 " w.c.	***PASS***
Ta (deg C)	***23***
RH (%)	***22***
Pa (mmHg)	***772***
Minimum Flow (L/min)	***1.0***
Max Flow (L/min)	***3.5***
Flow Cal Correlation	***0.993***
Source Level	***116***
Source Current (mA)	***60.3***
Ref Det Volts (VDC)	***1.1***
Cal Factor	**191**
Background (ug/m3)	***352***
Correlation	**0.9999** **PASS**



All aerosol calibrations are traceable to Arizona Road Dust

Calibration Certificate for High Volume Sampler

ANDERSEN INSTRUMENTS INC.

GS2310 Series Sampler Calibration

(Dickson Recorder)

Customer -> MTRC SITE Certificate -> 123085

Location -> Monitoring Station AM8 Date -> 16-Sep-11

Sampler -> 3283 Tech -> Chan Kin Fung

CONDITIONS

Sea Level Pressure	(hpa)	1006	Sampler Elevation	(feet)	100
Sea Level Pressure	(in Hg)	29.71	Corrected Pressure	(mm Hg)	751.97
Temperature	(deg C)	25	Temperature	(deg K)	298.00
Seasonal SL Pressure	(in Hg)	29.71	Corrected Seasonal	(mm Hg)	751.97
Seasonal Temperature	(deg C)	25.00	Seasonal Temperature	(deg K)	298.00

CALIBRATION ORIFICE

Make -> Andersen Instruments Inc. Qstd Slope -> 1.99

Model -> G25A Qstd Intercept -> -0.014012

Serial# -> 5303 Date Certified ->

CALIBRATION

	Plate or Test #	H_2O (in)	Qstd (M^3/min)	I (chart)	IC (corrected)	LINEAR REGRESSION	
1	18	13.5	1.844	61	60.677	Slope =	27.5829
2	13	10.9	1.657	56	55.704	Intercept =	10.4072
3	10	8.3	1.447	52	51.725	Corr. Coeff. =	0.9961
4	7	5.3	1.158	43	42.772		
5	5	3.3	0.915	35	34.815		

Calculations

Qstd = 1/m [Sqrt (H_2O (Pa/Pstd) (Tstd/Ta)) - b]

IC = I [Sqrt (Pa/Pstd) (Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
1/m ((I) [Sqrt (298/Tav) (Pav/760)] - b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

This is to certify that the above equipment has been calibrated in accordance with manufacturer's procedure.

MTR Corporation
Internal Calibration

Project Laboratory MTR

Balance Calibration Report
Tested to MTRC Method WI/707M/01

Laboratory Equipment Identification Number			BA0011		
Manufacturer	Sartorius	Model	A200S-**DIB	Serial No.	1065989
Capacity	120g	Discrimination	0.1mg	Type	Top Loading
Location	Concrete Testing Area		Temperature	25℃	

Reference Mass Set Used (Equip. ID. No.)		RM001	
Manufacturer	Troemner	OIML Classification	F1
Last Calibration Date	29-04-2002	Calibrated By	South China National Centre of Metrology

(1) Repeatability of Reading

Reference Mass (g)	Standard Deviation of Balance Reading (g)	Maximum Difference Between Successive Readings (g)
10	0.000071	0.0002
60	0.0001333	0.0002
120	0.0001287	0.0003

Standard Deviation of the Balance = 0.0001333

(2) Departure from Nominal Value

Reading (g)	Correction (g)	Uncertainty (g)
10.0001	-0.0001	±0.000361
20.0001	-0.00005	
30.0001	-0.00005	
40.0001	0.00003	
50.0002	-0.00028	
60.0001	-0.00018	
70.000	0.00002	
80.0001	-0.00008	
90.0000	0.00005	
100.0001	-0.00025	

Maximum Correction = -0.00028

(3) Off-Centre Loading

A mass of approximately 60 was moved to various position on the balance pan. The balance readings obtained at different position are given in the table.

Centre	Front	Back	Left	Right
60.0001	60.0001	60.0004	59.9997	59.9997

Maximum Difference = 0.0007

(4) Hysteresis

Load (g)	Hysteresis (g)
50	-0.0001333

(5) Limit of Performance of the Balance = ± 0.000680

Checked by : Kenny Li Certified by : _____

Date : 13-02-2009 Date : 16/12/2009

Notes:

1.The balance has been tested according to the specifications laid down in Chapter 6 of the CSIRO Publication "The Calibration of Balances - by David B. Prowse".

2.Uncertainties quoted in this report have been estimated on the basis of there being not more than one chance in one hundred that any value differs from the true value by more than the stated uncertainty.

3.The Limit of Performance is the tolerance band within which all readings of the balance will fall.

Calibration Certificates for Sound Level Meter and Calibrator

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	20th December, 2010	***Certificate Number***	MLCN101573S

Customer Information

Company Name	MTR Corporation Limited
Address	MTR Tower, Telford Plaza, 33 Wai Yip St., Kowloon Bay, Kowloon, Hong Kong

Unit Under Test (UUT)

Description	Precision Integrating Sound Level Meter
Manufacturer	Brüel & Kjær
Model Number	Type 2236
Serial Number	1794284
Equipment Number	-

Calibration Result

* One of the battery case terminals was found broken.
* The UUT Range display was found blurred.
* All calibration results are within the manufacturer's specification.
* Calibration data are detailed on the attached sheet(s).

Approved By

Laboratory Manager

萬儀校正中心有限公司
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MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	20th December, 2010	*Certificate Number*	MLCN101573S

Calibration Status

Date of Calibration			20th December, 2010
Calibration Equipment Used			4231 (MLTE008)/ CA1002184/ 8th Mar 2012
Calibration Procedure			MLCG00 & MLCG15.
Calibration Uncertainty			±0.2 dB
Calibration Condition	*Lab*	*Temperature*	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	UUT	*Stabilizing Time*	Over 3 hours
		Warm-up Time	10 minutes
		Supply Voltage	Internal battery

Calibration Data

UUT Setting				UUT Rdg	Std Rdg	UUT Error	UUT Error Limit
Frequency Wt.	Parameter	Response	Range (dB)				
A (1 kHz Input)	SPL	F	20 - 100	94.2 dB	94 dB	0.2 dB	0.7 dB
		S		94.1 dB	94 dB	0.1 dB	0.7 dB
		I		94.2 dB	94 dB	0.2 dB	0.7 dB
C (1 kHz Input)		F	20 - 100	94.2 dB	94 dB	0.2 dB	0.7 dB
		S		94.2 dB	94 dB	0.2 dB	0.7 dB
		I		94.2 dB	94 dB	0.2 dB	0.7 dB
L (1 kHz Input)		F	20 - 100	94.2 dB	94 dB	0.2 dB	0.7 dB
		S		94.2 dB	94 dB	0.2 dB	0.7 dB
		I		94.2 dB	94 dB	0.2 dB	0.7 dB
A (1 kHz Input)		F	40 - 120	114.1 dB	114 dB	0.1 dB	0.7 dB
		S		114.1 dB	114 dB	0.1 dB	0.7 dB
		I		114.1 dB	114 dB	0.1 dB	0.7 dB

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MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	20th December, 2010	***Certificate Number***	MLCN101570S

Customer Information

Company Name	MTR Corporation Limited
Address	MTR Tower, Telford Plaza, 33 Wai Yip St., Kowloon Bay, Kowloon, Hong Kong

Unit Under Test (UUT)

Description	Sound Level Calibrator
Manufacturer	Brüel & Kjær
Model Number	4231
Serial Number	1807710
Equipment Number	-

Calibration Result

* All calibration results within the manufacturer's specification.
* Calibration data are detailed on the attached sheet(s).

Approved By

Laboratory Manager

* Calibration equipment used for this calibration are traceable to national / international standards.
* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the UUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.
* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the UUT.
*

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CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	20th December, 2010	***Certificate Number***	MLCN101570S

Calibration Status

Date of Calibration			20th December, 2010
Calibration Equipment Used			4231 (Spec) (MLTE008)/ CA1002184/ 8th Mar 2012 1351 (MLTE049)/ MLEC10/06/04/ 15th Jun 2011
Calibration Procedure			MLCG00 & MLCG15.
Calibration Uncertainty			± 0.1 dB
Calibration Condition	***Lab***	***Temperature***	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	UUT	***Stabilizing Time***	Over 3 hours
		Warm-up Time	Not applicable
		Supply Voltage	Internal battery

Calibration Data

UUT Setting	STD Rdg	UUT Error	UUT Error Limit
94 dB	94.0 dB	0.0 dB	0.2 dB
114 dB	114.1 dB	0.1 dB	0.2 dB

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