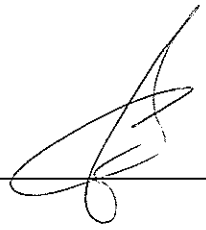
MTR Corporation Limited

West Island Line Project

Baseline Monitoring Report (Part 2) for Works Area MA

Verified by: 

Position: Independent Environmental Checker

Date: 13 August 2009

MTR Corporation Limited

West Island Line Project

Baseline Monitoring Report (Part 2) for Works Area MA

Certified by: Glenn Frommer

Position: Environmental Team Leader

Date: 13 August 2009

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 2) have been conducted for both dust and noise at the proposed monitoring locations in the vicinity of Works Area MA to establish baseline levels for both dust and noise for the civil construction work within Works Area MA.

Results and Conclusions

Baseline monitoring (Part 2) 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 2) presents the results for the baseline monitorings conducted for both dust and noise at the proposed monitoring locations in the vicinity of Works Area MA and establishes baseline levels for both dust and noise for the civil construction work within Works Area MA. Baseline monitorings for other works areas are to be conducted subsequently and the baseline monitoring reports for these works areas will be submitted accordingly.

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

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ENSR MAUNSELL ENSR Asia (HK) Ltd. / AECOM	WEST ISLAND LINE ENVIRONMENTAL IMPACT ASSESSMENT MAJOR GROUND LEVEL WORKS AREAS/ WORKS SITES - KEY PLAN (SHEET 1 OF 7)	SCALE: A3 1:10000	DATE: DEC. 07	
		CHECK: FWYW	DRAWN: WDF	
		JOB No.: 60017115	DRAWING No.: FIGURE 1	REV

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2 AIR QUALITY

2.1 MONITORING METHODOLOGY

Monitoring was undertaken 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 (AM4) as specified in the EM&A Manual for both 1-hour and 24-hour TSP measurements have been established at the Chee Sing Kok Social Centre of the Humanity Love (current name for the building premise), see figure 2.1.

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

24-hour TSP measurements were carried out over a period of at least 14 days at the monitoring stations to establish the ambient 24-hour TSP levels.

24-hour samples were collected by High Volume Sampler (Graseby-Andersen) following United Sates Environmental Protection Agency regulations and 1-hour TSP levels were measured by real time dust monitor (MIE - DataRam).

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. 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 certified laboratory or manufacturer shall be carried out every two years 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.

N

830100 E

830300 E

830500 E

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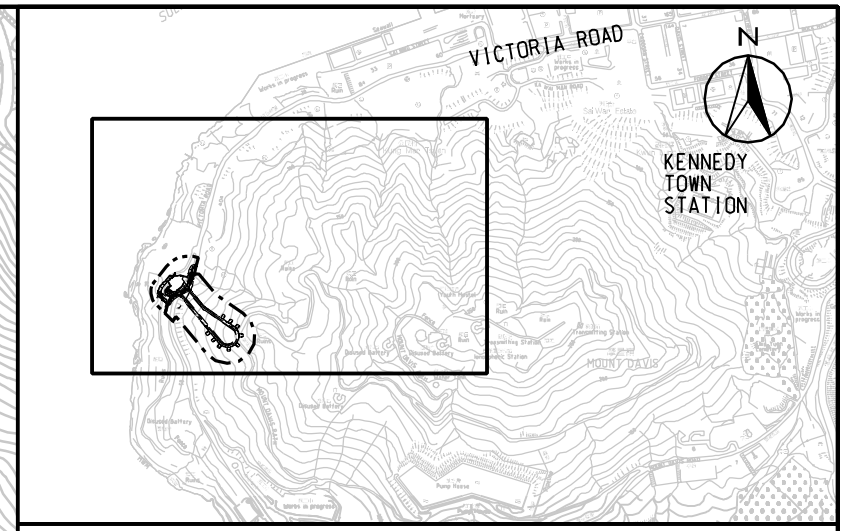
AM4

VICTORIA ROAD



KEY PLAN

A3 1:15000

LEGEND:

- STATION STRUCTURE
- UNDERGROUND STRUCTURE
- WORKS SITE
- UNDERGROUND WORKS SITE
- SURFACE WORKS AREA
- DUST MONITORING LOCATIONS

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WEST ISLAND LINE ENVIRONMENTAL IMPACT ASSESSMENT

LOCATIONS OF DUST MONITORING STATIONS - KENNEDY TOWN STATION

(SHEET 2 OF 2)

SCALE	A3 1:2000	DATE	DEC. 2007
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JOB No.	60017115	DRAWING No.	Figure 2.1
		REV	-

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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 2 July 2009 and 17 July 2009. 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 southwest, with some days from the east. Some rainy periods were recorded in the monitoring period, and the baseline monitoring period had to be extended.

Table 2.4a 1-hour TSP Baseline Level

Monitoring Location	Average 1-h TSP Level (μg/m^3)
Chee Sing Kok Social Centre of the Humanity Love (AM4)	37

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

It was noted that there were minor construction work along Victoria Road in the vicinity of Works Area MA by WSD's contractor during the monitoring period. Road traffic was observed along Victoria Road. The dust particulate generated from WSD's minor construction works and the exhaust fumes from the road traffic 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)
Chee Sing Kok Social Centre of the Humanity Love (AM4)	37	274	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

24-hour TSP baseline monitoring was conducted at the monitoring station in the vicinity of Works Area B between 2 July 2009 and 17 July 2009.

Weather conditions throughout 24hour-TSP monitoring period were mild and relatively dry, with light wind normally from southwest for the majority of the time, with some days from the east. Some rainy periods were recorded in the monitoring period, and the baseline monitoring period had to be extended.

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)**
Chee Sing Kok Social Centre of the Humanity Love (AM4)	43

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

It was noted that there were minor construction work along Victoria Road in the vicinity of Works Area MA by WSD's contractor during the monitoring period. Road traffic was observed along Victoria Road. The dust particulate generated from WSD's minor construction works and the exhaust fumes from the road traffic 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. 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)
Chee Sing Kok Social Centre of the Humanity Love (AM4)	43	158	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 to establish noise baseline levels in the vicinity of the Works Area MA, to provide data against which any environmental impacts due to construction activities can be compared.

The baseline monitoring station (CN1) as specified in the EM&A Manual was established at the following location, see Figure 3.1:

CN1 - Chee Sing Kok Social Centre of the Humanity Love (current name for the building premise)

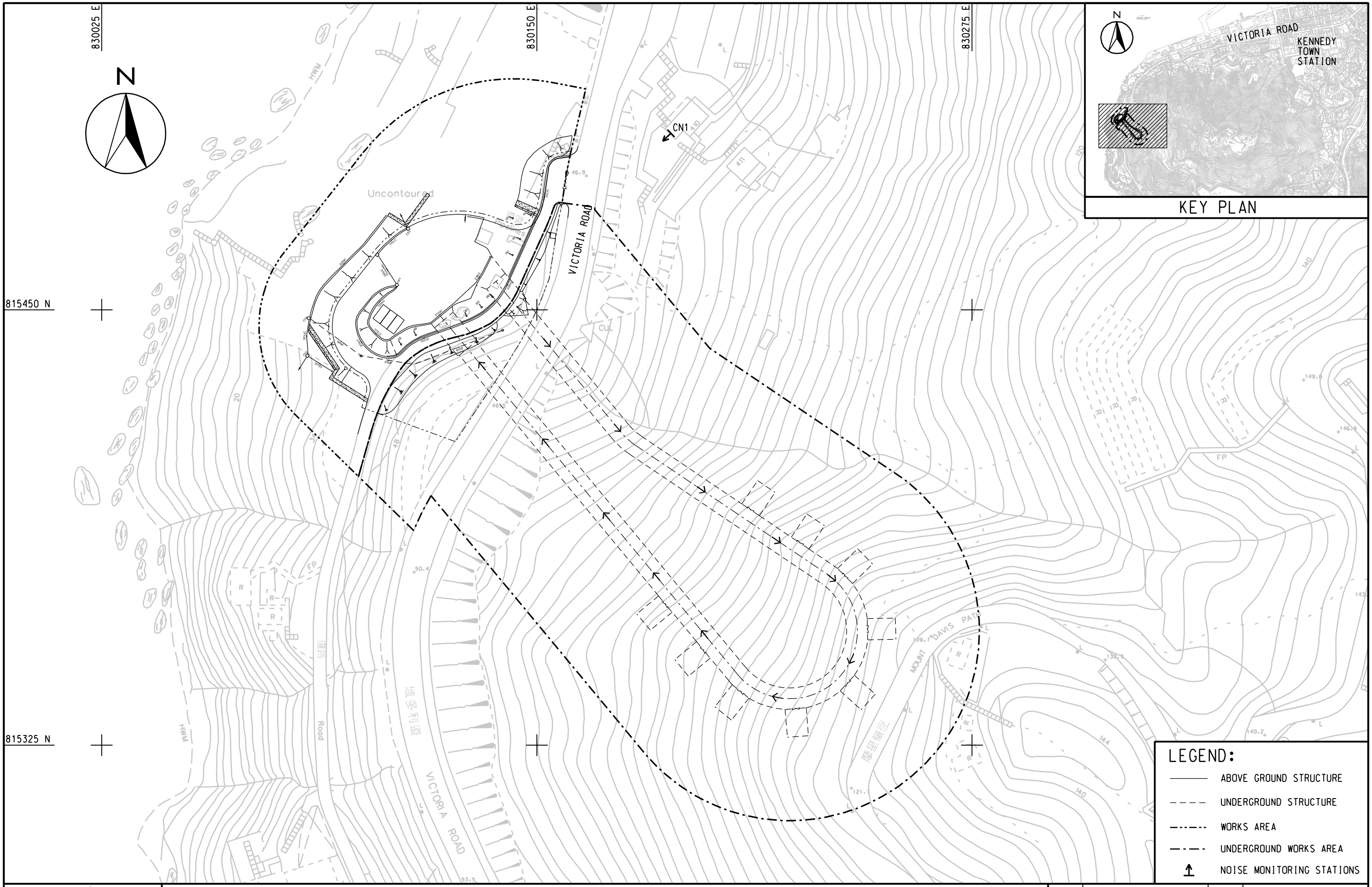
Consecutive noise measurements were undertaken over a period of at least 14 days to establish the ambient noise levels at representative nearest sensitive receivers. Continuous 5 minute A-weighted noise levels were recorded throughout the daytime, evening and night-time on weekdays (Monday to Saturday) and also on Sundays. The noise levels were then averaged 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 southwest for the majority of the time, with some days from the east. Some rainy periods were recorded in the monitoring period, and the baseline monitoring period had to be extended.

3.2 CALIBRATION REQUIREMENTS

A B&K 2236 sound level meter and B&K 4231 calibrator 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 sound level meter and calibrator are verified by the certified laboratory or manufacturer once every two years to ensure they perform to the same level of accuracy as stated in the manufacturer's specifications. Calibration certificates are attached in Annex C.



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WEST ISLAND LINE ENVIRONMENTAL IMPACT ASSESSMENT

LOCATIONS OF NOISE MONITORING STATIONS (CONSTRUCTION PHASE)

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		REV	–

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SZO: p:\projects\60017115\DRAWING\FIGURE\FIGURE 2.1.dgn

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 c*.

Table 3.3c Limit Levels for Construction Noise

Time Period	**Noise Level (dB) for NSRs around Works Area MA**
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 between 2 July 2009 and 18 July 2009.

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.*

It was observed that traffic in the locality contributed to the background, the minor construction activities from WSD's construction work also contributed to the background in some of the daytime periods. The vehicular traffic was considered the dominant noise sources for the area.

3.4 MAXIMUM ACCEPTABLE IMPACT LEVEL

Maximum Acceptable Impact Levels are recommended in instances where baseline levels approach or exceed stipulated limit levels.

The Maximum Acceptable Impact Level incorporates the baseline noise value and the identified construction limit level by logarithmically summing the two values. This amended level will, therefore, be greater than the limit level and represents the maximum allowable noise level at a specific monitoring station.

As the baseline noise levels are lower than the limit level, the Maximum Acceptable Impact Levels for the noise monitoring station CN1 will not be adopted.

4 CONCLUSION

4.1 BASELINE LEVEL

4.1.1 Air

1-hour TSP

1-hour TSP baseline monitoring was conducted at the monitoring station, namely Chee Sing Kok Social Centre of the Humanity Love (AM4) between 2 July 2009 and 17 July 2009. Baseline TSP levels were recorded in the range of 25 μg/m^3 and 104 μg/m^3.

24-hour TSP

24-hour TSP baseline monitoring was conducted at the monitoring station at Chee Sing Kok Social Centre of the Humanity Love (AM4) between 2 July 2009 and 17 July 2009. Baseline TSP results between 20 μg/m^3 and 68 μg/m^3 had been recorded.

4.1.2 Noise

Baseline monitoring was conducted at the monitoring station, namely Chee Sing Kok Social Centre of the Humanity Love (CN1) from 2 July 2009 to 18 July 2009. Baseline noise levels have been established for weekday and Sunday periods.

Baseline noise levels between 57.5 and 62.5 dB(A) had been recorded from 0700 – 1900hr for the monitoring station. It was also noted that the noise levels were in general higher than 60dB(A) between 0800 – 1700hr.

The major noise sources are noticed from the vehicular traffic with contribution from the minor construction activities carried out by the WSD's contractor along the Victoria 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 μg/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: Chee Sing Kok Social Centre of the Humanity Love
Samples between: 02/07/2009 and 17/07/2009

Report Date 07/08/2009

Sample Code	Date	Start Time	Parameter	Value	Units
Location:		**Chee Sing Kok Social Centre of the Humanity Love**			
Sample Type:		**Dust Sample**			
AM4/001	02/07/2009	14:30	Total Suspended Particulate (1 hr)	26.7	µg/cu.m
AM4/002	03/07/2009	15:00	Total Suspended Particulate (1 hr)	35.0	µg/cu.m
AM4/003	04/07/2009	15:00	Total Suspended Particulate (1 hr)	47.7	µg/cu.m
AM4/004	05/07/2009	14:15	Total Suspended Particulate (1 hr)	30.0	µg/cu.m
AM4/005	06/07/2009	15:15	Total Suspended Particulate (1 hr)	40.6	µg/cu.m
AM4/006	07/07/2009	14:30	Total Suspended Particulate (1 hr)	41.6	µg/cu.m
AM4/007	08/07/2009	15:00	Total Suspended Particulate (1 hr)	28.0	µg/cu.m
AM4/008	09/07/2009	14:45	Total Suspended Particulate (1 hr)	25.6	µg/cu.m
AM4/009	10/07/2009	10:45	Total Suspended Particulate (1 hr)	27.6	µg/cu.m
AM4/010	11/07/2009	15:00	Total Suspended Particulate (1 hr)	104.0	µg/cu.ı
AM4/011	12/07/2009	14:30	Total Suspended Particulate (1 hr)	33.9	µg/cu.m
AM4/012	13/07/2009	14:45	Total Suspended Particulate (1 hr)	28.3	µg/cu.m
AM4/013	14/07/2009	12:00	Total Suspended Particulate (1 hr)	27.5	µg/cu.m
AM4/014	15/07/2009	13:30	Total Suspended Particulate (1 hr)	26.7	µg/cu.m
AM4/015	16/07/2009	15:15	Total Suspended Particulate (1 hr)	29.5	µg/cu.m
AM4/016	17/07/2009	14:45	Total Suspended Particulate (1 hr)	30.8	µg/cu.m

Project: West Island Line
Report for Location: Chee Sing Kok Social Centre of the Humanity Love
Samples between: 02/07/2009 and 17/07/2009

Report Date 07/08/2009

Sample Code	Date	Start Time	Parameter	Value	Units
Location:		**Chee Sing Kok Social Centre of the Humanity Love**			
Sample Type:		**Dust Sample**			
AM4/001	02/07/2009	15:30	Total Suspended Particulate (24 hr)	64.9	µg/cu.m
AM4/002	03/07/2009	15:00	Total Suspended Particulate (24 hr)	56.0	µg/cu.m
AM4/003	04/07/2009	17:00	Total Suspended Particulate (24 hr)	67.4	µg/cu.m
AM4/004	05/07/2009	16:15	Total Suspended Particulate (24 hr)	49.5	µg/cu.m
AM4/005	06/07/2009	16:15	Total Suspended Particulate (24 hr)	35.1	µg/cu.m
AM4/006	07/07/2009	14:15	Total Suspended Particulate (24 hr)	44.2	µg/cu.m
AM4/007	08/07/2009	16:15	Total Suspended Particulate (24 hr)	65.2	µg/cu.m
AM4/008	09/07/2009	14:45	Total Suspended Particulate (24 hr)	63.4	µg/cu.m
AM4/009	10/07/2009	10:45	Total Suspended Particulate (24 hr)	51.7	µg/cu.m
AM4/010	11/07/2009	15:00	Total Suspended Particulate (24 hr)	26.7	µg/cu.m
AM4/011	12/07/2009	14:30	Total Suspended Particulate (24 hr)	26.6	µg/cu.m
AM4/012	13/07/2009	15:30	Total Suspended Particulate (24 hr)	20.3	µg/cu.m
AM4/013	14/07/2009	12:00	Total Suspended Particulate (24 hr)	27.9	µg/cu.m
AM4/014	15/07/2009	13:30	Total Suspended Particulate (24 hr)	29.8	µg/cu.m
AM4/015	16/07/2009	15:30	Total Suspended Particulate (24 hr)	25.6	µg/cu.m
AM4/016	17/07/2009	15:45	Total Suspended Particulate (24 hr)	32.0	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: Chee Sing Kok Social Centre of the Humanity Love (CN1)
Baseline between: 02/07/09 - 18/07/09

Report date: 07/08/09

Parameter : Leq

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

	LAeq,30min	L10	L90
07:00-07:30	57.5	60.7	51.8
07:30-08:00	58.9	61.8	53.5
08:00-08:30	60.1	63.0	53.5
08:30-09:00	60.9	64.2	54.1
09:00-09:30	61.7	64.8	55.7
09:30-10:00	60.8	64.0	54.8
10:00-10:30	61.8	65.0	55.5
10:30-11:00	61.5	64.5	55.2
11:00-11:30	61.7	64.8	55.2
11:30-12:00	61.8	64.7	55.1
12:00-12:30	59.4	62.5	53.0
12:30-13:00	59.3	62.6	53.0
13:00-13:30	58.8	61.8	53.5
13:30-14:00	61.1	64.2	54.6
14:00-14:30	62.5	65.9	55.3
14:30-15:00	62.0	65.0	55.7
15:00-15:30	62.0	65.0	55.6
15:30-16:00	61.6	64.5	55.4
16:00-16:30	61.7	64.8	55.4
16:30-17:00	60.9	63.9	54.7
17:00-17:30	61.2	64.1	55.5
17:30-18:00	59.8	62.8	53.9
18:00-18:30	58.7	61.8	52.6
18:30-19:00	58.9	62.2	52.8

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

	LAeq,30min	L10	L90
07:00-19:00	60.8	63.9	54.5

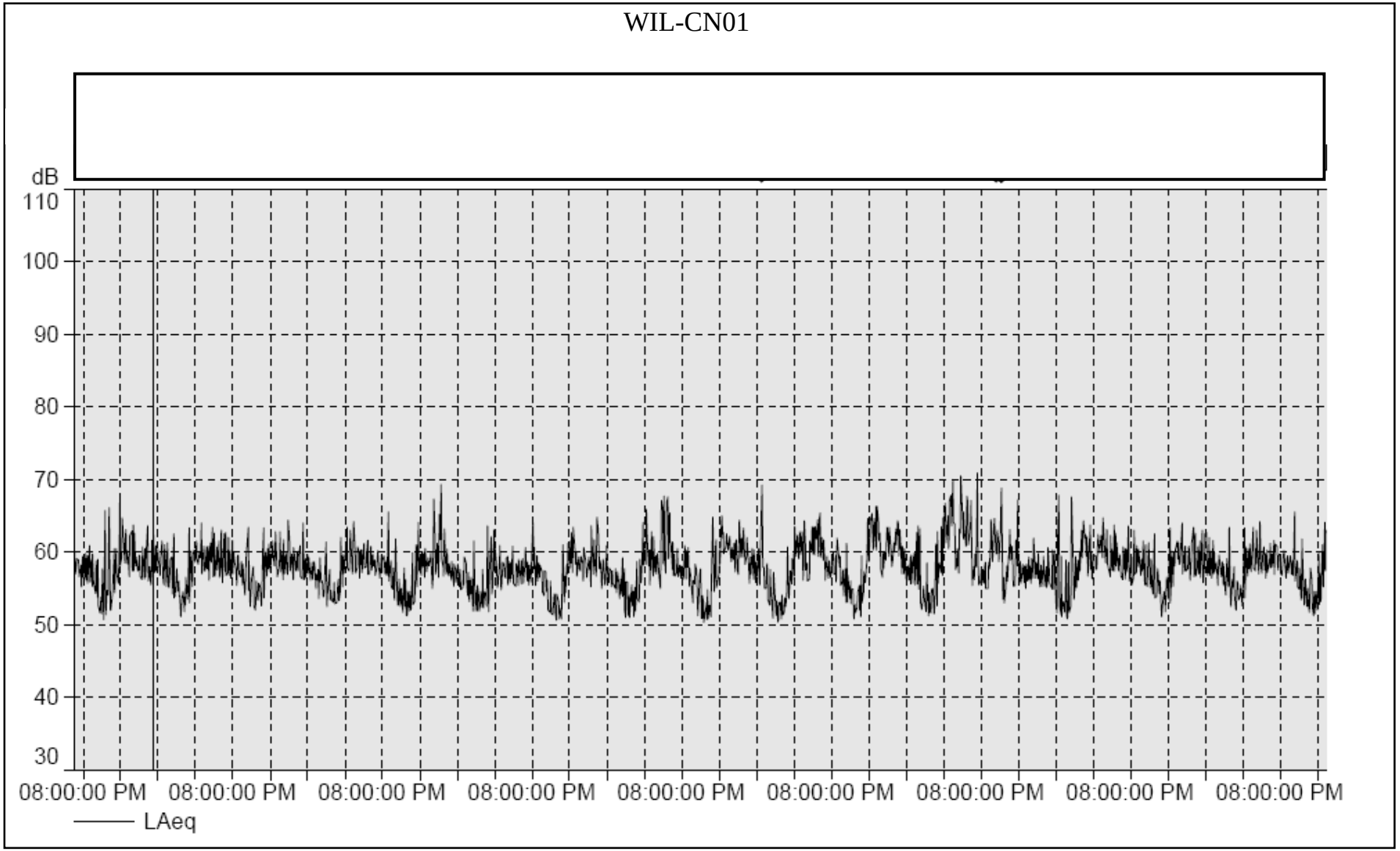
	LAeq,5min	L10	L90
19:00-23:00	58.5	61.2	53.9
23:00-07:00	55.8	58.1	51.7

Sundays/General Holidays Noise Level, dB(A)

	LAeq,5min	L10	L90
07:00-19:00	58.1	60.9	52.8
19:00-23:00	57.6	60.1	53.1
23:00-07:00	55.4	57.8	51.0

Logarithmic Averaging is being used.

WIL-CN01


dB
110
100
90
80
70
60
50
40
30
08:00:00 PM
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08:00:00 PM
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08:00:00 PM
LAeq

ANNEX C

Calibration Certificates for Monitoring Equipment

ThermoFisher
SCIENTIFIC
27 FORGE PARKWAY
FRANKLIN MA 02038
TOLL FREE: 866-282-0430
TEL: 508-553-6949
FAX: 508-541-8366
www.thermo.com/aqi

DR2000 CALIBRATION CERTIFICATE

This calibration is traceable to the National Institute of Standards and Testing

SERIAL NUMBER:	**2003**	
CALIBRATION RATIO:	**0.991**	
AVG. DR CONCENTRATION:	**2.47**	**mg/m3**
MASTER AVG CONCENTRATION:	**2.04**	**mg/m3**
PDR BACKROUND CONCENTRATION:	**0.332**	**mg/m3**

TEMPERATURE: 73 F
RH: 39 %

CALIBRATION MASTER: D187
LAST CALIBRATED: 5/1/2009

TECHNICIAN: KL **DATE:** 5/19/2009

ANDERSEN INSTRUMENTS INC.

GS2310 Series Sampler Calibration

(Dickson Recorder)

SITE

Location -> Victoria Rd. Magazine Site Date -> 16-Jun-09

Sampler -> 994-0870 Tech -> Chan Kin Fung

CONDITIONS

Sea Level Pressure	(hpa)	1005	Sampler Elevation	(feet)	300
Sea Level Pressure	(in Hg)	29.68	Corrected Pressure	(mm Hg)	746.17
Temperature	(deg C)	28	Temperature	(deg K)	301.00
Seasonal SL Pressure	(in Hg)	29.68	Corrected Seasonal	(mm Hg)	746.17
Seasonal Temperature	(deg C)	28.00	Seasonal Temperature	(deg K)	301.00

CALIBRATION ORIFICE

Make ->	Andersen Instruments Inc.	Qstd Slope ->	1.99
Model ->	25A	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	12	1.723	60	59.155	Slope =	32.1856
2	13	9.8	1.558	54	53.239	Intercept =	3.4743
3	10	7.5	1.364	48	47.324	Corr. Coeff. =	0.9995
4	7	4.9	1.104	40	39.436		
5	5	3.1	0.879	32	31.549		

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)

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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.

MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	30th December, 2008	***Certificate Number***	MLCN081193S

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	1814957
Equipment Number	-

Calibration Result

* All calibration results are 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.
*

The service is provided under a HKQAA ISO9001:2000 certified quality system of Certificate No. CC1929.

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MAXLAB

CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	30th December, 2008	*Certificate Number*	MLCN081193S

Calibration Status

Date of Calibration			30th December, 2008
Calibration Equipment Used			4231 (MLTE008)/ CA0801167/ 24th Feb 2010
Calibration Procedure			MLCG00 & MLCG15.
Calibration Uncertainty			±0.2 dB
Calibration Condition	*Lab*	*Temperature*	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	UUT	*Stabilizing Time*	24 hours
		Warm-up Time	10 minutes
		Supply Voltage	Not applicable

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	93.9 dB	94 dB	-0.1 dB	0.7 dB
		S		93.9 dB	94 dB	-0.1 dB	0.7 dB
		I		93.9 dB	94 dB	-0.1 dB	0.7 dB
C (1 kHz Input)		F	20 - 100	93.9 dB	94 dB	-0.1 dB	0.7 dB
		S		93.9 dB	94 dB	-0.1 dB	0.7 dB
		I		93.9 dB	94 dB	-0.1 dB	0.7 dB
L (1 kHz Input)		F	20 - 100	93.9 dB	94 dB	-0.1 dB	0.7 dB
		S		93.9 dB	94 dB	-0.1 dB	0.7 dB
		I		93.9 dB	94 dB	-0.1 dB	0.7 dB
A (1 kHz Input)		F	40 - 120	113.9 dB	114 dB	-0.1 dB	0.7 dB
		S		113.9 dB	114 dB	-0.1 dB	0.7 dB
		I		113.9 dB	114 dB	-0.1 dB	0.7 dB

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MAXLAB
CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	6th November, 2008	***Certificate Number***	MLCN080973S

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	1795391
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.
*

The service is provided under a HKQAA ISO9001:2000 certified quality system of Certificate No. CC1929.

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MAXLAB
CALIBRATION CERTIFICATE

Certificate Information

Date of Issue	6th November, 2008	***Certificate Number***	MLCN080973S

Calibration Status

Date of Calibration			6th November, 2008
Calibration Equipment Used			4231 (Spec) (MLTE008)/ CA0801167/ 24th Feb 2008 1351 (MLTE049)/ MLEC08/06/02/ 14th Jun 2009
Calibration Procedure			MLCG00 & MLCG15.
Calibration Uncertainty			± 0.1 dB
Calibration Condition	***Lab***	***Temperature***	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	UUT	***Stabilizing Time***	24 hours
		Warm-up Time	Not applicable
		Supply Voltage	Not applicable

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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ANNEX D

Response to Comments on Baseline Monitoring Report (Part 1) for Works Area B

Response to Comments on Baseline Monitoring Report (Part 1) for Works Area B

Item	EPD's Comments	Responses
1	(a) It is noted that in Section 3.4 and annex C of the report, the "Maximum Acceptable Impact Level" was proposed as an alternative to the normal Limit Levels for construction noise impact at the two monitoring locations, namely CN3 – Lui Ming Choi Primary School and CN21 – The Merton (Block 2) (b) According to section 2.21 of the EM&A Manual, "To account for cases where ambient noise levels as identified by baseline monitoring approach or exceed the stipulated Limit Levels prior to commencement of construction, a Maximum Acceptable Impact Level may be defined and agreed with EPD, which incorporates the baseline noise levels and the identified construction noise Limit Level." **The "Maximum Acceptable Impact Level" approach is generally NOT the preferred approach** as it assumes the ambient noise levels measured during the baseline monitoring period to remain constant throughout the construction period of the Project. The preferred approach in impact noise monitoring is to measure the noise levels with and without construction work and then calculate the actual noise impact from the construction work itself. This eliminates the need for the assumption mentioned above.	Noted.
2	In any event, even when "Maximum Acceptable Impact Level" approach is used, the limit level values of 70dB(A) and 75dB(A) used for the monitoring locations CN3 and CN21 respectively in the Annex C of the report appear erroneous, as the predicted mitigated construction noise levels (59-70dB(A) for CN3 and 40-65dB(A) for CN21) should have been used instead.	Noted. The "Maximum Acceptable Impact Level" approach will not be adopted for the monitoring locations CN3 and CN21. Annex C of the Baseline Monitoring Report (Part 1) for Works Area B is deleted.
	IEC's Comments	
3	In accordance with Section 2.3 of EM&A manual, $L_{eq(15min)}$ shall be used as the monitoring parameter for the time period other than 0700 and 1900 hours on normal weekdays.	It is mentioned in Section 3.1 of the Baseline Monitoring Report that 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 above monitoring parameter satisfies the requirement in Section 2.13 of EM&A Manual for the time period other than 0700 and 1900 hours on normal weekdays.

Item	EPD's Comments	Responses
4	In accordance with Section 9.5 of EM&A manual, the TSP levels shall be measured by following the standard method as set out in High Volume Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulation of the USEPA. The Baseline Report described that laser dust meter was used for 1-hr TSP measurement, justification shall be provided.	As it is not explicitly specified in the Section for Baseline Monitoring of the EM&A Manual that HVS has to be used for 1-hr TSP baseline monitoring, 1-hr TSP levels are measured by real time dust monitor (MIE-DataRam). The 24-hr TSP baseline monitoring has to be carried out continuously and there are technical difficulties for conducting the 1-hr TSP baseline monitoring by HVS at the same monitoring location. Please note that the use of real time dust monitor (MIE-DataRam) for 1-hr TSP monitoring had been accepted by EPD for the past railway projects of MTR and it has been recently accepted for use in the Tsim Sha Tsui Station Northern Subway Project.

Noise Baseline Report

Project: West Island Line
Report for Location: Lui Ming Choi Primary School (CN3)
Baseline between: 01/06/09 - 21/06/09

Report date: 07/07/09

Parameter : Leq

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

	LAeq,30min	L10	L90
07:00-07:30	63.1	65.4	59.3
07:30-08:00	64.1	66.3	60.5
08:00-08:30	64.6	66.6	61.4
08:30-09:00	65.1	66.9	62.0
09:00-09:30	66.0	67.9	62.8
09:30-10:00	65.7	67.6	62.7
10:00-10:30	66.9	68.9	63.1
10:30-11:00	66.3	68.2	63.0
11:00-11:30	66.4	68.2	62.8
11:30-12:00	65.9	67.7	62.8
12:00-12:30	65.7	67.5	62.6
12:30-13:00	65.7	67.3	61.8
13:00-13:30	65.1	67.0	62.0
13:30-14:00	66.0	67.8	62.6
14:00-14:30	65.4	67.5	62.3
14:30-15:00	65.5	67.3	62.2
15:00-15:30	66.4	67.7	62.2
15:30-16:00	65.6	67.5	62.3
16:00-16:30	65.2	67.1	62.0
16:30-17:00	65.8	67.5	62.2
17:00-17:30	65.9	68.0	62.2
17:30-18:00	65.3	67.4	61.8
18:00-18:30	65.4	67.7	61.5
18:30-19:00	64.4	66.4	60.9

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

	LAeq,30min	L10	L90
07:00-19:00	65.5	67.4	62.1

	LAeq,5min	L10	L90
19:00-23:00	63.5	65.8	59.4
23:00-07:00	60.3	62.7	56.4

Sundays/General Holidays Noise Level, dB(A)

	LAeq,5min	L10	L90
07:00-19:00	63.1	65.4	59.0
19:00-23:00	62.7	65.3	58.1
23:00-07:00	59.1	61.7	54.3

Logarithmic Averaging is being used.

Noise Baseline Report

Project: West Island Line
Report for Location: The Merton - Block 2 (CN21)
Baseline between: 02/06/09 - 22/06/09

Report date: 07/07/09

Parameter : Leq

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

	LAeq,30min	L10	L90
07:00-07:30	66.7	69.6	59.7
07:30-08:00	67.4	70.1	61.2
08:00-08:30	68.0	70.8	61.7
08:30-09:00	69.0	71.8	62.5
09:00-09:30	68.8	71.7	62.7
09:30-10:00	69.3	72.1	63.4
10:00-10:30	69.5	72.3	63.5
10:30-11:00	69.2	71.9	63.3
11:00-11:30	69.2	71.8	63.3
11:30-12:00	69.3	72.0	63.6
12:00-12:30	68.7	71.4	62.7
12:30-13:00	68.2	71.0	62.4
13:00-13:30	68.8	71.3	63.5
13:30-14:00	68.9	71.4	63.3
14:00-14:30	68.5	70.9	63.2
14:30-15:00	68.4	70.9	62.8
15:00-15:30	68.3	70.9	62.4
15:30-16:00	68.0	70.6	62.9
16:00-16:30	68.3	70.8	62.9
16:30-17:00	68.2	70.5	63.1
17:00-17:30	68.1	70.6	63.2
17:30-18:00	68.3	70.5	62.9
18:00-18:30	67.7	70.4	62.8
18:30-19:00	67.7	70.3	62.7

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

	LAeq,30min	L10	L90
07:00-19:00	68.5	71.1	62.8

	LAeq,5min	L10	L90
19:00-23:00	66.3	68.9	60.5
23:00-07:00	63.0	65.5	56.3

Sundays/General Holidays Noise Level, dB(A)

	LAeq,5min	L10	L90
07:00-19:00	66.4	69.0	59.8
19:00-23:00	65.8	68.5	59.3
23:00-07:00	62.9	65.3	55.7

Logarithmic Averaging is being used.