



**Hongkong International
Theme Parks Limited**

Air Quality and Noise Monitoring During Fireworks Dress Rehearsal

Monitoring Report

August 2005

Environmental Resources Management

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Air Quality and Noise Monitoring During Fireworks Dress Rehearsal: *Monitoring Report*

12th August 2005

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For and on behalf of
Environmental Resources Management

Approved by: Freeman Cheung

Signed: 

Position: Executive Director

Date: 12th August 2005

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1.1

BACKGROUND

In accordance with the requirements stated in Section 3.1 of the Environmental Permit (FEP-01/059/2000 and EP-01/059/2000/A), the results of the trial fireworks displays and associated air quality and noise monitoring data were provided to Advisory Council on the Environment (ACE) for consultation on 11th July 2005.

Following the consultation meeting on 11th July 2005, the ACE has commented that the monitoring data for the trial fireworks display were generally valid (EPD's letter date 23rd July 05 (re: () in Ax (8) to EP2/N9/O/65)). However, in their views there were some gaps in the monitoring data, in particular, the Respirable Suspended Particulates (RSP) and noise levels. To address ACE's concerns, the Environmental Protection Department (EPD) required that an enhancement to the monitoring programme be made prior to the commencement of the operation of the park.

In response to the request from the EPD on 23rd July 2005, a subset of the operational monitoring has been brought forward for monitoring one night of the fireworks dress rehearsal for the period between 4th and 8th August 2005. In addition, to help guide the creative process of the fireworks display, noise monitoring was also conducted on the 3rd August 2005.

The method statement for the one-night testing of 24-hr RSP and noise during the fireworks dress rehearsal was submitted to the EPD on 27th July 2005 and was agreed by the EPD on 29th July 2005. Detail of the method statement is presented in *Annex A*.

ERM-Hong Kong, Ltd (ERM) was commissioned by the Hongkong International Theme Parks Ltd (HKITP) to conduct the 24-hr RSP and noise monitoring for the fireworks dress rehearsal during the period between 4th, to 8th August 2005. The agreed methodology as presented in the submitted method statement was adopted.

1.2

STRUCTURE OF THE REPORT

After this introductory section, the remainder of this report is arranged as follows:

Section 2 presents the air quality sampling results;

Section 3 presents the noise monitoring result; and

Section 4 presents an overall conclusion for the air and noise monitoring.

In view of the time constraints to gather one-night of complete set of monitoring data for consultation with ACE prior to the commencement of the operation of the park, a redundant High Volume Sampler (HVS) was setup at each of the agreed monitoring locations and 24-hr RSP sampling were undertaken during the fireworks dress rehearsal period between 4th and 8th August 2005. Also, additional noise monitoring locations and monitoring days were conducted. For clarification, we note that there were no fireworks shows on the 5th and 6th August 2005.

Annexes B and C present the additional air and noise monitoring data for the additional nights and locations, respectively.

In *Sections 2 and 3*, the data presented is for the agreed locations for the Maximum Night. The Maximum Night, namely 8th August 2005, is the night in which the highest noise levels were recorded at the agreed locations during the three nights of monitoring for air and noise.

2.1 SAMPLING METHODOLOGY

2.1.1 Sampling Parameter and Period

Respirable suspended particulates (RSP) have been collected for 24 hours for one-night during the fireworks dress rehearsal period between 4th to 8th August 2005.

2.1.2 Sampling Locations

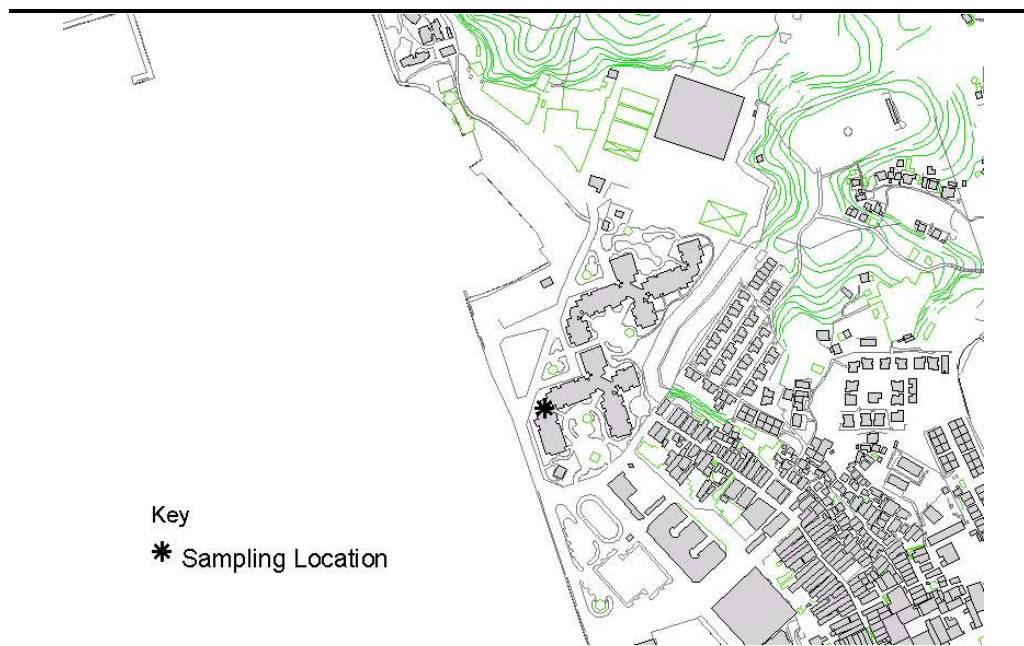
24-hr RSP were measured at two representative air sensitive receivers including:

- Rooftop of Peng Lai Court in Peng Chau (A1); and
- Rooftop of Crestmont Villa Management Office in Discovery Bay (A2).

Peng Lai Court, Peng Chau – A1

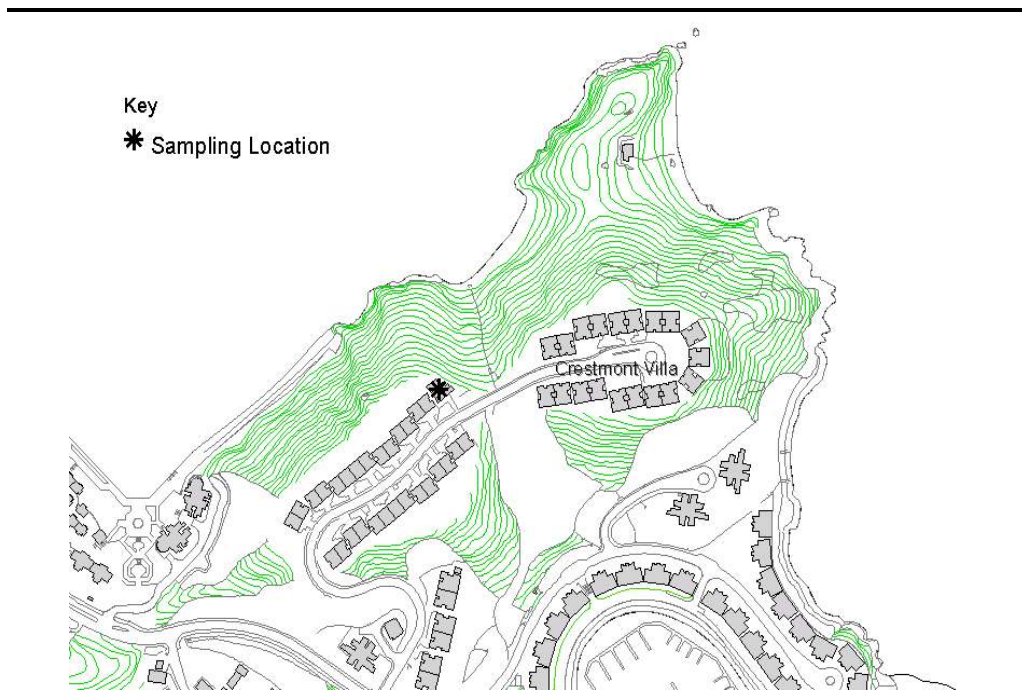
Peng Lai Court (A1) is a 5 to 6 storey high building, located approximately 2.8km from the main launch area. The sampling location was set at the rooftop approximately 15 m above the ground level. The sampling location is presented in *Figure 2.1*.

Figure 2.1 *Peng Lai Court in Peng Chau (A1)*



Crestmont Villa Management Office (A2) is a single storey high building, located approximately 2.7 km from the main launch area. The sampling location was set at the rooftop approximately 5 m above the ground level. The sampling location is presented in *Figure 2.2*.

Figure 2.2 *Crestmont Villa Management Office in Discovery Bay (A2)*



2.1.3 *Sampling and Analysis Methodology*

Air samples were collected at each sampling location by using HVSs and the samples were then analyzed by the HOKLAS laboratory using the US EPA Method IO-2.1 ⁽¹⁾.

2.2 *SAMPLING RESULTS AND DISCUSSION*

24-hr RSP was monitored at Peng Chau and Discovery Bay for one-night during the fireworks dress rehearsal for the Maximum Night (8th August 2005) and the results are summarized in *Table 2.1*.

The wind direction recorded on 8th August 2005 during the 24-hr period was generally from the east and southeast. The wind speed recorded was between 0.4 to 3.6 ms⁻¹ with an average wind speed of 2.3 ms⁻¹. Details of the laboratory testing results and the calibration curves are presented in *Annex D*.

⁽¹⁾ Reference to <http://www.epa.gov/ttn/amtic/files/ambient/inorganic/mthd-2-1.pdf>

Table 2.1 *Summary of Measured 24-hr RSP Monitoring Results in Peng Chau and Discovery Bay*

Sampling Location	24-hr RSP Results ($\mu\text{g m}^{-3}$)
	8 th Aug
Peng Chau	26
Discovery Bay	21
AQO Criterion	180

The 24-hr RSP concentrations measured at Peng Chau and Discovery Bay were very low on 8th August 2005 and were well below the AQO criterion of 180 $\mu\text{g m}^{-3}$. The highest measured 24-hr RSP concentration was 26 $\mu\text{g m}^{-3}$ at Peng Chau.

24-hr RSP baseline monitoring were conducted from 27th July to 2nd August in Peng Chau and Discovery Bay and the results are summarized in *Table 2.2*. The measured 24-hr RSP concentrations are comparable with the baseline RSP concentrations measured from 27th July to 2nd August. No measurable increase in 24-hr RSP concentration was detected at Peng Chau and Discovery Bay.

Table 2.2 *24-hr Baseline RSP Concentrations at Peng Chau and Discovery Bay*

Sampling Location	Baseline 24-hr RSP Concentrations ($\mu\text{g m}^{-3}$) ^(a)	
	Average	Range
Peng Chau	27	24 – 33
Discovery Bay	22	18 - 34
Note:		
(a) Measured from 27 th July to 2 nd August 2005.		

Furthermore, by comparing with the EPD's monitoring data at Tap Mun, Tung Chung and Central/Western (see *Table 2.3*), the RSP concentration measured during the fireworks shows were also similar to 24-hr RSP concentrations measured within Hong Kong.

Table 2.3 *Summary of 24-hr RSP Concentrations Measured at EPD Air Quality Monitoring Stations*

EPD AQMS ^(a)	Background 24-hr RSP Results ($\mu\text{g m}^{-3}$)
	8 th Aug
Tap Mun	17
Tung Chung	22
Central/Western	17
Note:	
(a) Averaging of 24 hourly RSP data obtained from EPD website (www.epd.gov.hk)	

2.3 *ADDITIONAL AIR QUALITY MONITORING*

In view of the time constraints to gather one-night of complete set of monitoring data for consultation with ACE, a redundant HVS was setup at each of the agreed monitoring locations and additional 24-hr RSP samplings were conducted on 4th and 7th August 2005. The results are presented in

Annex B. The results indicated that the measured 24-hr RSP concentrations were low and well below the statutory AQO criterion of 180 μgm^{-3} .

2.4

CONCLUSIONS

24-hr RSP were measured at the air sensitive receivers in Peng Chau and Discovery Bay during the fireworks dress rehearsal for the Maximum Night, 8th August 2005. The measured RSP concentrations were low and well below the statutory RSP criterion of 180 μgm^{-3} . Hence, no adverse air quality impact is anticipated on Peng Chau and Discovery Bay due to the fireworks show.

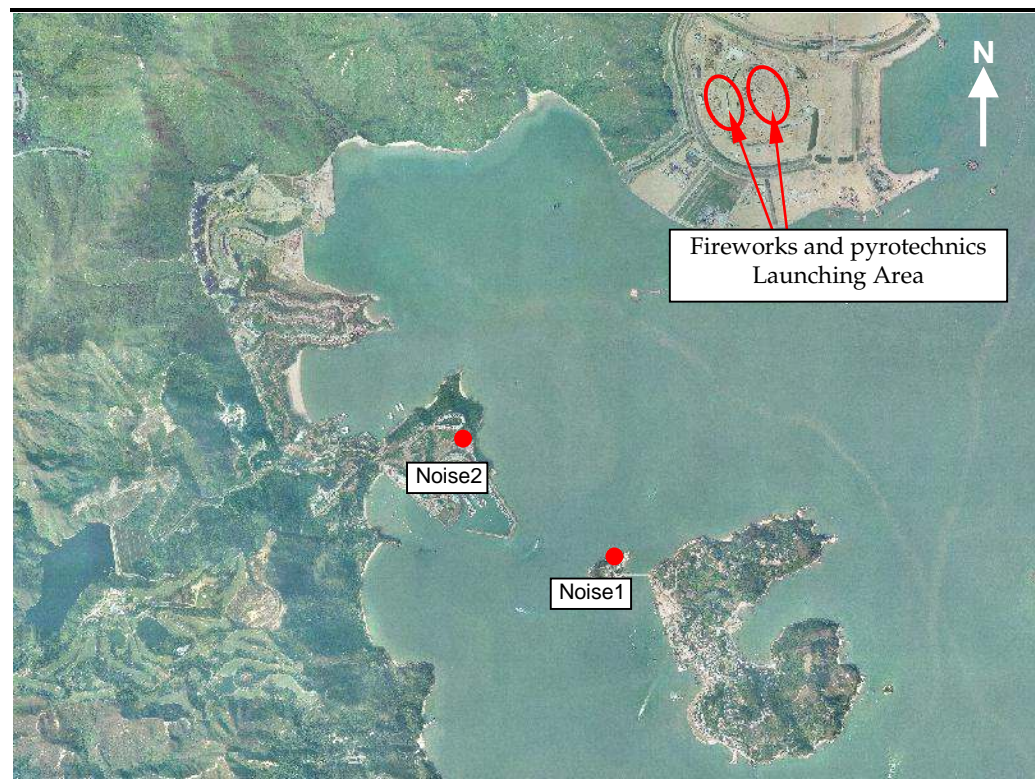
The monitoring results validate the EIA prediction that the fireworks program will not cause a significant air quality impact to the surrounding Air Sensitive Receivers.

3.1 NOISE MONITORING LOCATION

Noise monitoring was conducted for one-night during the fireworks dress rehearsal period at the two agreed monitoring locations namely Tai Lei, Peng Chau (NOISE1) and rooftop of Cherish Court, Discovery Bay (NOISE2).

The monitoring locations are shown in *Figure 3.1*.

Figure 3.1 Noise Monitoring Locations

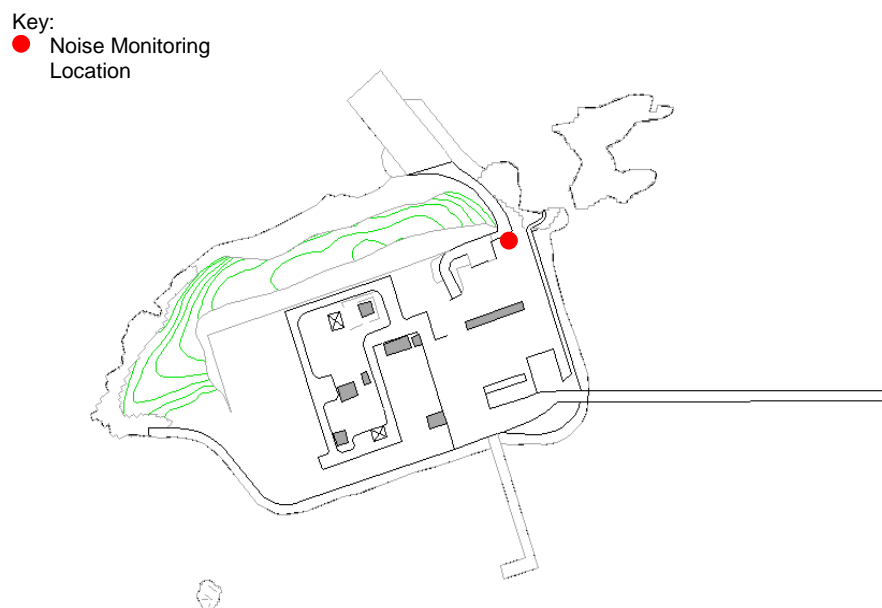


3.1.1 Site Description

Tai Lei, Peng Chau: NOISE1

Tai Lei, Peng Chau is located approximately 2.7 km from the main launch area. The façade measurement location was set at 1.2 m above the ground level with a direct view over looking Hong Kong Disneyland (HKDL). The monitoring location is presented in *Figures 3.2*.

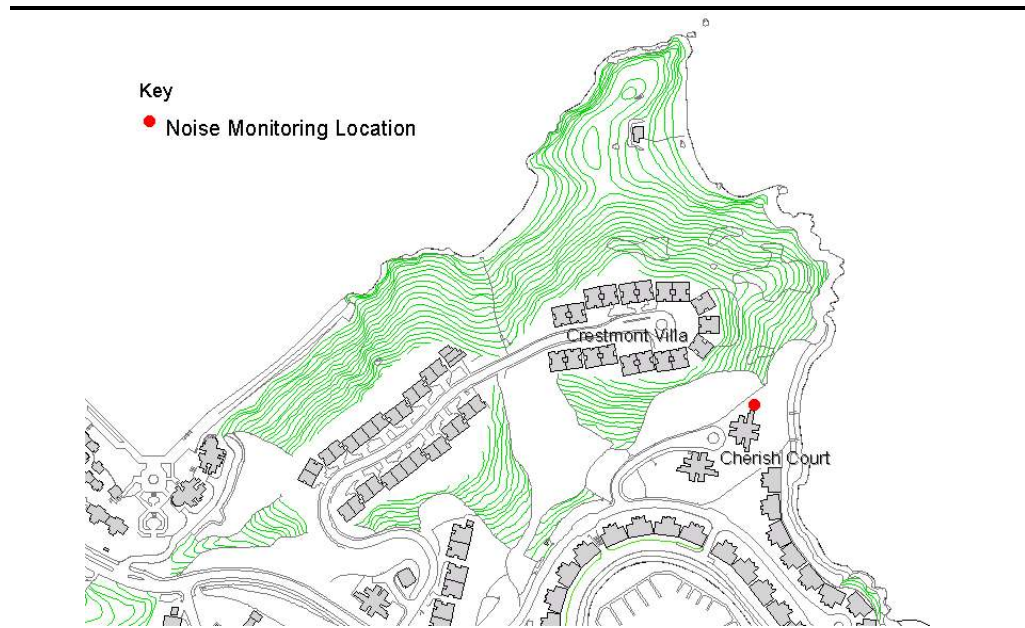
Figure 3.2 *Tai Lei, Peng Chau: NOISE1*



Rooftop of Cherish Court, Discovery Bay: NOISE2

Cherish Court is located approximately 2.4 km from the main launch area. The façade measurement location was set at rooftop of Cherish Court approximately 53 m above the ground level, with an unobstructed view over looking HKDL. Several locations within the Discovery Bay were considered for undertaking the noise measurements. In view of its location and height, it was considered that the rooftop of Cherish Court represents the worst affected location in terms of firework noise impacts. The monitoring location is presented in *Figures 3.3*.

Figure 3.3 **Rooftop of Cherish Court, Discovery Bay: NOISE2**



3.2 **MONITORING METHODOLOGY**

Façade noise measurements were carried out at the two agreed monitoring locations. The sound level meter and calibrator used for the noise monitoring, as listed in *Table 3.1* below, complies with IEC 651: 1979 and 804:1985 (Type 1) specification. The microphone was positioned at 1m from a façade, which has a direct line of sight to the Theme Park perimeter.

Table 3.1 **Noise Measurement Equipments**

Monitoring Location	Monitoring Equipment
NOISE1 –Tai Lei, Peng Chau	01-dB – Solo Sound Level Meter B&K 4231 calibrator
NOISE2 – Cherish Court, Discovery Bay	01-dB – Stell ~ Symphonie Measurement System B&K 4231 calibrator

Noise monitoring was conducted with reference to the calibration and measurement procedures as stated in the *Technical Memorandum for the Assessment of Noise from Places other than Domestic Premises, Public Places or Construction Sites*. Immediately prior to and following each noise measurement the accuracy of the monitoring equipment was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements were accepted as the calibration level from before and after the noise measurement agree to within 1.0 dB.

Noise measurements were made without the presence of fog and rain, and with steady wind speed and gusts not exceeding 5m/s and 10m/s, respectively. Measurement of L_{Aeq} has been recorded at 100ms interval.

A $L_{Aeq, 15 \text{ minute}}$ noise measurement was made starting from the start of the fireworks display. Ambient noise levels of at least 15 minutes were also

measured prior to and immediately after the 15 minutes firework measurement period for establishing the averaged background noise level. During the measurement, a detailed log of noise event was undertaken to record down any significant extraneous noise activities. The noise measurement was conducted in accordance with the agreed monitoring methodology (refer to *Annex A*). Any significant influences on the measured noise levels were taken into account in accordance with standard acoustical principles and practices.

3.3 MONITORING RESULTS

The measured results for the one-night fireworks dress rehearsal for the Maximum Night, 8th August 2005, are summarized in *Table 3.2*.

A temporary meteorological station (Model: Weather Monitor II, Davis) was set up at the rooftop of the Central Maintenance Facility, within HKDL. The wind sensor was positioned on a 3 m mast at the rooftop of the Central Maintenance Facility, approximately 9 m above the ground level. 1-minute average wind speed and wind data were recorded throughout the noise monitoring period.

The wind direction recorded during the 15-minute fireworks display (21:04 – 21:19) was 40% from the south, 33 % from the south-southeast and 27% from the south-southwest. The wind speed recorded was between 0.9 to 2.7 ms⁻¹ with an average wind speed of 1.6 ms⁻¹.

No significant local extraneous noise sources were recorded during the measurement period at all monitoring locations.

Table 3.2 *Monitoring Results ($L_{eq, 15 \text{ min}}$ dB(A))*

	Tai Lei, Peng Chau	Cherish Court, DB
Ambient measurement before	47.9	54.0
Ambient measurement after	49.6	55.1
Averaged Background Noise Levels	48.8	54.6
$L_{eq, 15 \text{ min}}$ measurement during the fireworks displays	51.8	56.9
Corrected Fireworks Noise Levels	48.8	53.0
Noise Criterion ($L_{eq, 15 \text{ min}}$)	55	55

The monitoring results indicated that the corrected firework noise levels at all monitoring locations complied with the stipulated noise criterion of $L_{eq, 15 \text{ min}}$ 55 dB(A).

3.4 ADDITIONAL NOISE MONITORING

In view of the time constraints to gather one-night of complete set of monitoring data for consultation with ACE, additional noise monitoring were

conducted during the fireworks dress rehearsal period on 4th and 7th August 2005. In addition, noise monitoring was also conducted at three additional monitoring locations during the fireworks dress rehearsal display.

To help guide the creative process of the fireworks display, noise monitoring was also conducted on the 3rd August 2005. The results of the additional monitoring are presented in *Annex C*. Results indicated that the firework noise levels at all monitoring locations on all nights complied with the stipulated noise criterion of $L_{eq, 15min}$ 55 dB(A).

3.5

CONCLUSIONS

In response to the EPD's request, a subset of the operational monitoring has been brought forward for monitoring one-night of the fireworks dress rehearsal for the period between 4th to 8th August 2005. The monitoring results conducted for the Maximum Night indicated that the firework noise levels at all monitoring locations complied with the stipulated noise criterion of $L_{eq, 15 min}$ 55 dB(A). Results also indicated that the additional monitoring at all monitoring locations at all nights complied with the stipulated noise criterion of $L_{eq, 15min}$ 55 dB(A).

In response to the request from the EPD on 23rd July 2005, a subset of the operational monitoring has been brought forward for monitoring one-night of the fireworks dress rehearsal period between 4th and 8th August 2005. The data presented is for the agreed locations for the Maximum Night. The Maximum Night is the night in which the highest noise levels were recorded at the agreed locations, namely 8th August 2005.

In view of the time constraints to gather one-night of a complete set of monitoring data for consultation with ACE, a redundant HVS was setup at each of the agreed monitoring locations and additional 24-hr RSP sampling were undertaken during the fireworks dress rehearsal period between 4th and 8th August 2005. Also, additional noise monitoring locations and monitoring days were conducted between 4th and 8th August 2005 to ensure one-night of a complete set of monitoring data are gathered. In addition, to help guide the creative process of the fireworks display, noise monitoring was also conducted on the 3rd August 2005.

4.1

AIR QUALITY MONITORING

24-hr RSP were measured at the air sensitive receivers in Peng Chau and Discovery Bay for one-night during the fireworks dress rehearsal period between 4th and 8th of August 2005. The measured RSP concentrations on the Maximum Night, 8th August 2005, were low and well below the statutory RSP criterion of 180 μgm^{-3} . Hence, no adverse air quality impact is anticipated on Peng Chau and Discovery Bay due to the fireworks show.

The additional 24-hr RSP samples were also conducted during the fireworks dress rehearsal period on 4th and 7th August 2005. The measured RSP concentrations were low and well below the statutory RSP criterion.

The monitoring results validate the EIA prediction that the fireworks program will not cause a significant air quality impact to the surrounding Air Sensitive Receivers.

4.2

NOISE MONITORING

Noise measurements were conducted at the two agreed monitoring locations for one-night during the fireworks dress rehearsal period between 4th and 8th August 2005. The monitoring results conducted on the Maximum Night, 8th August 2005, indicated that the firework noise levels at all monitoring locations complied with the stipulated noise criterion of $L_{eq, 15 \text{ min}}$ 55 dB(A).

The additional noise monitoring conducted during the fireworks dress rehearsal period on 3rd, 4th and 7th August 2005 indicated that the firework noise levels at all monitoring locations complied with the stipulated noise criterion of $L_{eq, 15 \text{ min}}$ 55 dB(A).

Annex A

Method Statement

Method Statement on Air Quality and Noise Monitoring On 1 day during Fireworks Dress Rehearsal Period

Air Quality Sampling

Sampling Locations

24-hour RSP sampling will be conducted during 1 day within the firework dress rehearsal period, at (1) the rooftop of Peng Lai Court on Peng Chau and (2) the rooftop of the Management Office of Crestmont Villa at Discovery Bay (Figures 1 & 2) – the exact sampling locations employed for the monitoring during trial fireworks displays in May 2005.

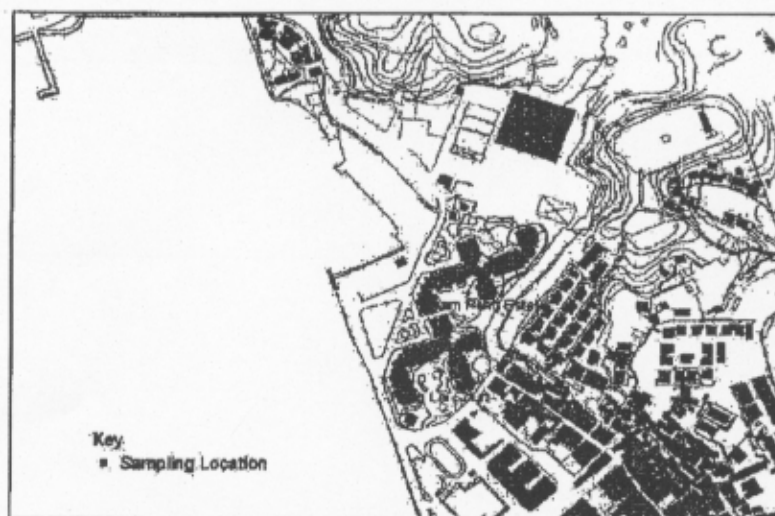


Figure 1 AM1 – Peng Lai Court

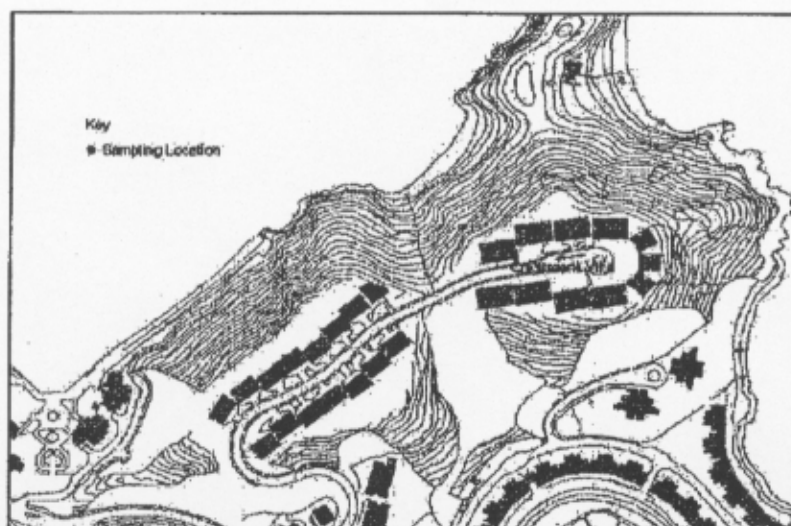


Figure 2 AM2 – Crestmont Villa

These two ambient measurements shall be averaged together to form the "average ambient sound pressure level". This average will be called the Background Noise Level (BNL) and will be calculated using the following calculation:

$$BNL = 10 \times \log[(10^{(\text{ambient before}/10)} + 10^{(\text{ambient after}/10)})/2]$$

Show Monitoring

A Leq_{A15min} measurement will be taken for the 15 minutes timeframe during the fireworks show that will include all fireworks noise. During monitoring, any non-fireworks noise events will be logged. An adjustment will be made where appropriate to allow for any significant influence on the measured firework noise level in accordance with standard acoustical principles and practices. The result of this edited measurement will be the Measured Noise Level (MNL).

Show Analysis-

Based on the MNL, the Corrected Noise Level (CNL) will be calculated using the following calculation:

$$CNL = 10 \times \log(10^{(MNL/10)} - 10^{(BNL/10)})$$

The CNL will be the noise level created by the Fireworks Show at HKDL, which will then be compared against the Acceptable Noise Levels (ANL) as stipulated in the EM&A Manual.

Key
• Noise Monitoring Location

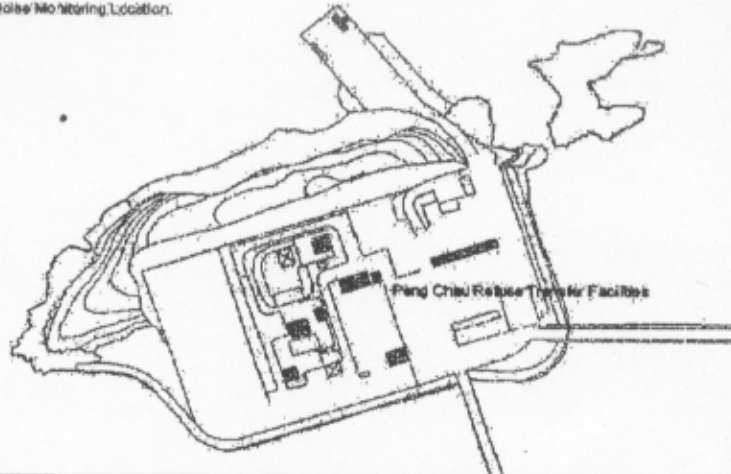


Figure 3 NM1 – Tai Lei, Peng Chau

Key
• Noise Monitoring Location

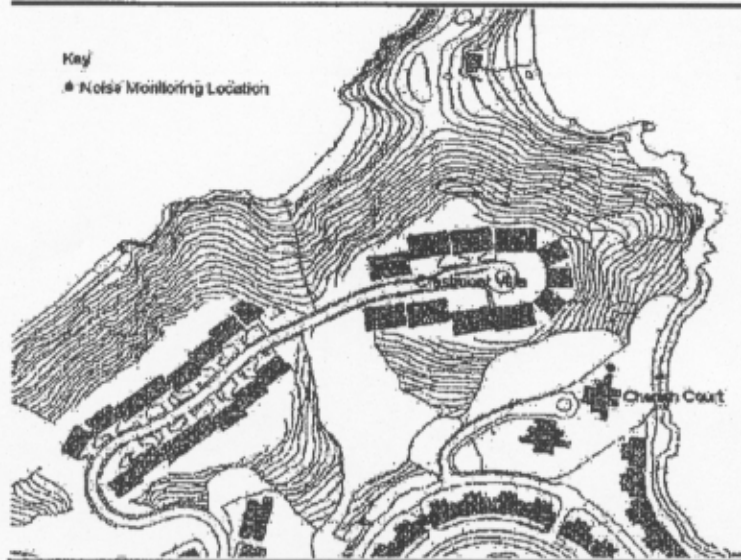


Figure 4 NM2 – Cherish Court

The monitoring station will be positioned at a point 1 m from an external building façade as close to the noise sensitive receivers as practicable, having the least obstructed view to HKDL and free of extraneous noise disturbance as far as possible, to reflect the worst case noise impact in accordance with standard acoustical practices.

Methodology

Ambient Noise Measurement

Two Leq_{A15min} ambient measurements will be taken at each of the required locations, Discovery Bay and Peng Chau. The first Leq_{A15min} ambient measurement will be taken immediately prior to the fireworks show and the second immediately following the show.

Methodology

24-hr RSP sampling will be conducted following USEPA protocols. The full description of these methods can be found on the USEPA air quality website (<http://www.epa.gov/ttnamtl/inorg.html>).

RSP will be quantified using a high volume sampler (HVS) running continuously over a 24-hour period (<http://www.epa.gov/ttnamtl/inorg.html> Chapter IO-2.1). The following specifications will be required:

- 0.6-1.7 m³/min (20-60 SCFM) adjustable flow range;
- timing/control device for 24 hour operation (+/- 2 min accuracy);
- elapsed timer for 24 hour operation (+/- 2 min accuracy);
- minimum exposed area of 406 cm² (63 in²);
- flow control accuracy of +/- 2.5% deviation over 24 hour period;
- electronic mass flow rate controller;
- flow recorder for continuous monitoring;
- impactor design size-select inlet for RSP;
- incorporated with a manometer;
- ability to hold and seal the filter paper to the sampler housing at horizontal position.

The final 24-hour RSP concentration will be calculated by taking the total weight of the particles collected on the high volume sampler filter, divided by the total volume of air that was drawn through the device.

RSP results will be compared to the Hong Kong Air Quality Objectives of 180 ug/m³ (Table 3.2a, BIA).

Noise Monitoring

Sampling Locations

Noise monitoring will be conducted at one night during the firework dress rehearsal period at (1) Tai Lei, Peng Chau and (2) rooftop of Cherish Court, Discovery Bay (*Figures 3 & 4*) which were the exact sampling locations employed for the monitoring during trial fireworks displays in May 2005.

Annex B

Additional Air Quality Sampling Results

ANNEX B: 24-HOUR RSP MONITORING RESULTS

In view of the time constraints to gather one-night of a complete set of monitoring data for consultation with ACE, additional 24-hour RSP monitoring were also conducted during the fireworks dress rehearsal on 4th and 7th August 2005. The measurement results are summarized in *Table B.1*.

Table B.1 *Summary of Measured 24-hour RSP Monitoring Results in Peng Chau and Discovery Bay*

Sampling Location		24-hour RSP Results ($\mu\text{g m}^{-3}$)		
		4 th Aug	7 th Aug	8 th Aug
Peng Chau	Sample 1	32	24	26 ⁽¹⁾
	Sample 2	33	22	26
Discovery Bay	Sample 3	28	18	20
	Sample 4	32	18	21 ⁽¹⁾
AQO Criterion		180		

(1) The shaded results represent the results for the Maximum Night based on noise levels for the agreed monitoring locations.

Furthermore, by comparing with the EPD's monitoring data at Tap Mun, Tung Chung and Central/Western (see *Table B.2*), the additional RSP concentrations measured on 4th and 7th August were also similar to 24-hour RSP concentrations measured within Hong Kong.

Table B.2 *Summary of 24-hour RSP Concentrations Measured at EPD Air Quality Monitoring Stations*

EPD AQMS	Background 24-hour RSP Results ($\mu\text{g m}^{-3}$) ^(a)	
	4 th Aug	7 th Aug
Tap Mun	31	26
Tung Chung	33	18
Central/Western	28	16

Note:
 (a) Mean of 24 hourly RSP data obtained from EPD website (www.epd.gov.hk)

The results indicated that the measured 24-hour RSP concentrations were low and complied with the AQO criterion of $180\mu\text{g m}^{-3}$ and no noise measurable increase in 24-hour RSP concentration was detected at Peng Chau and Discovery Bay.

Annex C

Additional Noise Monitoring Results

ANNEX C – ADDITIONAL NOISE MONITORING RESULTS

In view of the time constraints to gather one-night of complete set of monitoring data for consultation with ACE, additional noise monitoring was conducted during the fireworks dress rehearsal period between 4th and 7th August 2005. In addition, to help guide the creative process of the fireworks display, noise monitoring was also conducted on the 3rd August 2005.

Additional noise monitoring were also conducted at three additional monitoring locations during the fireworks dress rehearsal display, and the measured results are presented in *Table C1* below.

1.1 ADDITIONAL NOISE MONITORING LOCATIONS

Three additional monitoring locations were identified for the noise monitoring for the fireworks dress rehearsal display, namely Peng Chau Radio Transmission Station (NOISE3), Rooftop of Greenwood Court, Discovery Bay (NOISE4) and Renovated Building at Sam Pak Wan, Discovery Bay (NOISE5). The monitoring locations are shown in *Figure C1*.

Figure C1 Noise Monitoring Locations

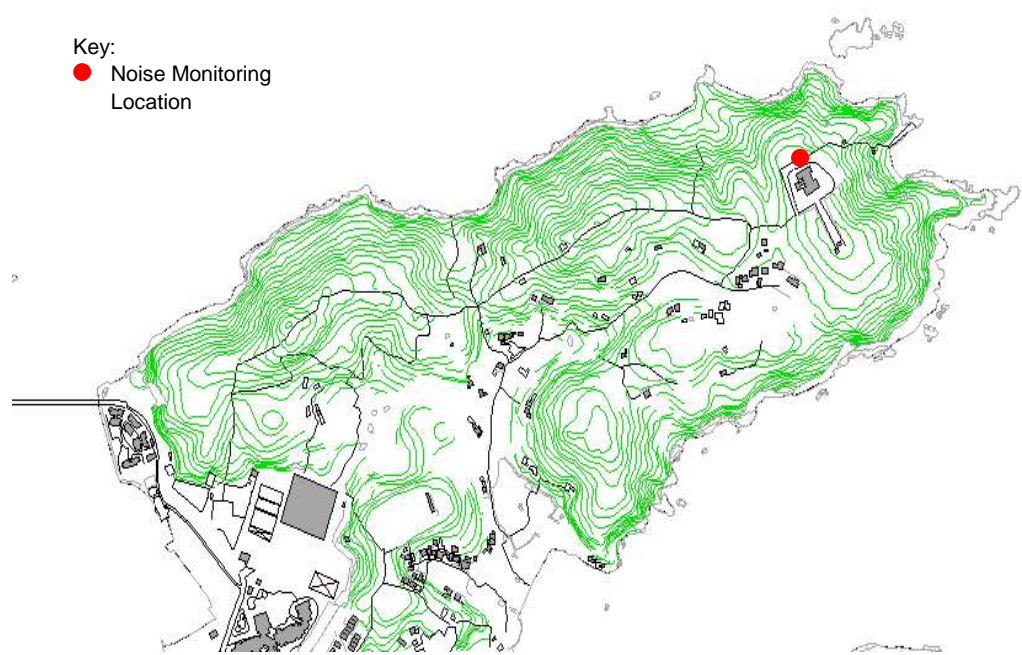


Peng Chau Radio Transmission Station

Peng Chau Radio Transmission Station is located approximately 2.5 km from the main launch area. The Radio Transmission Station is located at the top of

the hill and away from the population, approximately 32m high. The façade measurement location was set at the rooftop of the 2 storey high transmission station at approximately 7m above ground with a direct view over looking HKDL. In view that the accessibility of this monitoring location is relatively difficult and away from the population, this would minimise the potential extraneous noise caused by people watching the firework show. The monitoring location is presented in *FiguresC2*.

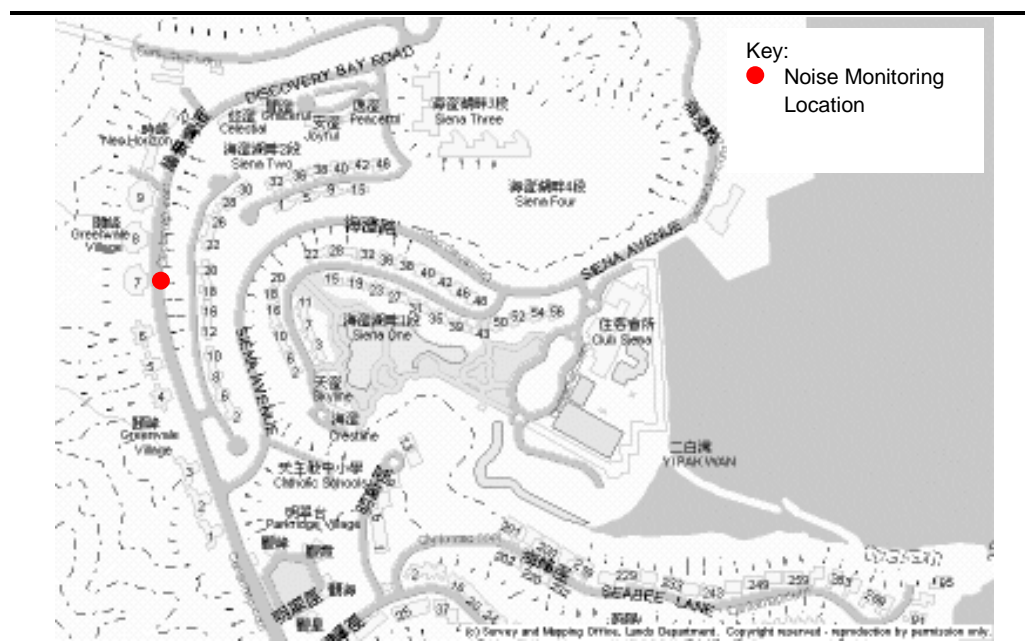
Figure C2 *Peng Chau Radio Transmission Station: NOISE3*



Greenwood Court, Discovery Bay

Greenwood Court is a high rise development (24 storey) within Discovery Bay located approximately 2.9 km from the main launch area. The façade measurement location was set at rooftop of Greenwood Court approximately 67 m above the ground level, with an unobstructed view over looking HKDL. However, the main launch site is partially screened by the ridgeline. The monitoring location is presented in *Figures C3*.

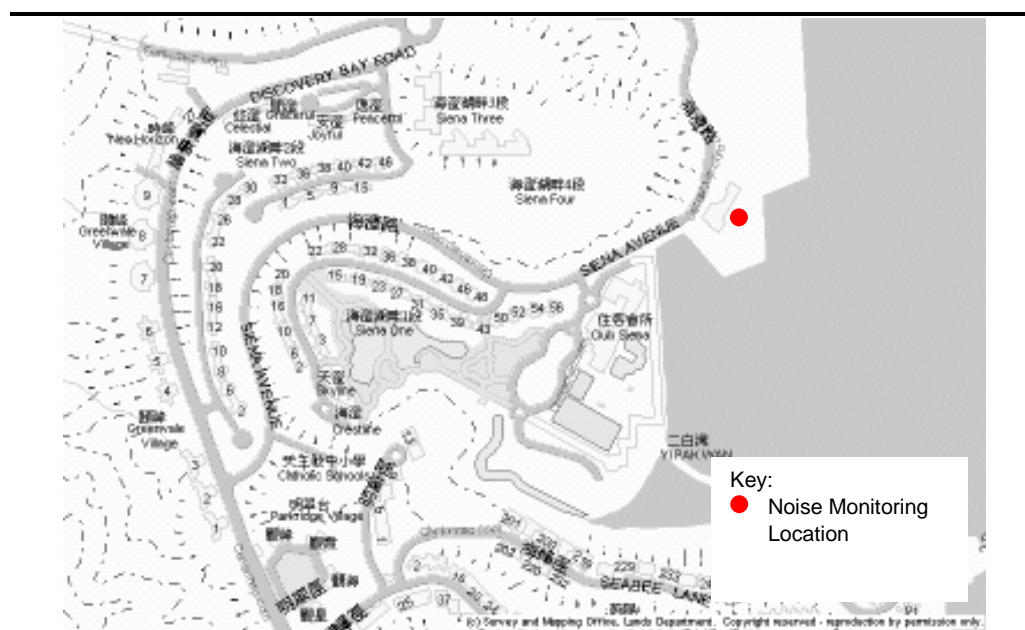
Figure C3 *Greenwood Court, Discovery Bay: NOISE4*



Renovated Building at Sam Pak Wan, Discovery Bay

The renovated building is located at the waterfront of Sam Pak Wan approximately 2.4 km from the main launch area. The façade measurement location was set at 1.2 m above the ground level with a direct view over looking HKDL. Similar to Greenwood Court, the main launch site is partially screened by the ridgeline. In view that this monitoring location is of limited access and away from the main population, this would minimise the potential extraneous noise caused by people watching the firework show. In addition, during the measurement, there were no construction activities in the vicinity of the monitoring location. The monitoring location is presented in *Figures C4*.

Figure C4 *Renovated Building at Sam Pak Wan: NOISE5*



1.2 NOISE MONITORING

1.2.1 3rd August 2005

It was observed that at the Tai Lei, Peng Chau monitoring location, there were people cheering during the time of the firework noise measurement. Having reviewed the noise measurement data, the noise contribution from these extraneous noises was not considered significant, and therefore the influence of the extraneous noise was not take into account. For the other four monitoring locations, there were no significant local extraneous noise sources recorded during the measurement.

1.2.2 4th August 2005

Similar to the 3rd August show, it was observed that at the Tai Lei, Peng Chau monitoring location, there were people cheering during the time of the firework noise measurement. Having reviewed the noise measurement data, the noise contribution from these extraneous noises was not considered significant, and therefore the influence of the extraneous noise was not take into account. For the other four monitoring locations, there were no significant local extraneous noise sources recorded during the measurement.

1.2.3 7th August 2005

Similar to the 3rd and 4th August show, it was observed that at the Tai Lei, Peng Chau monitoring location, there were people cheering during the time of the firework noise measurement. Having reviewed the noise measurement data, the noise contribution from these extraneous noises was not considered significant, and therefore the influence of the extraneous noise was not take into account.

At the Renovated Building at Sam Pak Wan, the noise measurement was continuously influenced by noise from nearby frogs during the whole measurement period. Having review the noise measurement data, the contribution from these extraneous noise source are considered as part of the natural background noise levels, but this effect significantly increased the overall background noise levels before and during the fireworks display.

For the other three monitoring locations, there were no significant local extraneous noises recorded during the measurement.

1.3 RESULTS

The monitoring results conducted indicated that the firework noise levels at all monitoring locations on all night complied with the stipulated noise criterion of $L_{eq, 15 \text{ min}} 55 \text{ dB(A)}$. In addition, the monitoring results confirmed that Cherish Courtis a representative NSR within Discovery Bay for the purpose of firework noise monitoring.

Table C1 Monitoring Results ($L_{eq, 15 \text{ min}}$ dB(A))

	Tai Lei, Peng Chau				Cherish Court, DB				Peng Chau Radio Transmission Station				Greenwood Court, DB				Building at Sam Pak Wan, DB			
	3 Aug	4 Aug	7 Aug	8 Aug	3 Aug	4 Aug	7 Aug	8 Aug	3 Aug	4 Aug	7 Aug	8 Aug	3 Aug	4 Aug	7 Aug	8 Aug	3 Aug	4 Aug	7 Aug	8 Aug
Ambient measurement before	46.8	51.7	42.8	47.9 ⁽²⁾	51.7	52.8	53.7	54.0 ⁽²⁾	52.0	51.7	52.2	51.9	53.9	53.3	55.2	53.3	43.6	43.0	52.2	46.9
Ambient measurement after	45.7	51.2	44.2	49.6 ⁽²⁾	53.0	52.9	52.7	55.1 ⁽²⁾	52.6	51.2	52.1	52.6	52.6	53.8	52.2	53.0	44.2	42.6	49.1	50.5
Averaged Background Noise Levels	46.3	51.5	43.6	48.8 ⁽²⁾	52.4	52.9	53.2	54.6 ⁽²⁾	52.3	51.5	52.2	52.3	53.3	53.6	54.0	53.2	43.9	42.8	50.9	49.1
$L_{eq, 15 \text{ min}}$ measurement during the fireworks displays	46.3	52.2	46.6	51.8 ⁽²⁾	55.7	54.4	54.5	56.9 ⁽²⁾	53.4	52.2	53.7	53.8	51.0	52.6	54.7	53.8	45.2	44.4	53.0	50.2
Corrected Fireworks Noise Levels	<46.3 ⁽¹⁾	43.9	43.7	48.8 ⁽²⁾	52.9	49.2	48.7	53.0 ⁽²⁾	47.0	43.9	48.3	48.7	<51.0 ⁽¹⁾	<52.6 ⁽¹⁾	46.7	44.8	39.3	39.4	48.8	43.6
Noise Criterion ($L_{eq, 15 \text{ min}}$)	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55

Note:

(1) The noise levels during the fireworks displays are equal to or lower than the averaged background noise levels. Hence, the actual corrected fireworks noise levels cannot be calculated.

(2) The shaded results represent the results for the Maximum Night for the agreed monitoring locations.

Annex D

Calibration Curves of High Volume Sampler

Calibration Data For High Volume Sampler (RSP)

Date : 26-Jul-05 Temp. : 31

Sampler Code : CM-AIR-132

Client : ERM Press. : 1002

Name

Int. Clock : 7410

Operator : Y C Pang

Carbon :

Location : Peng Chau

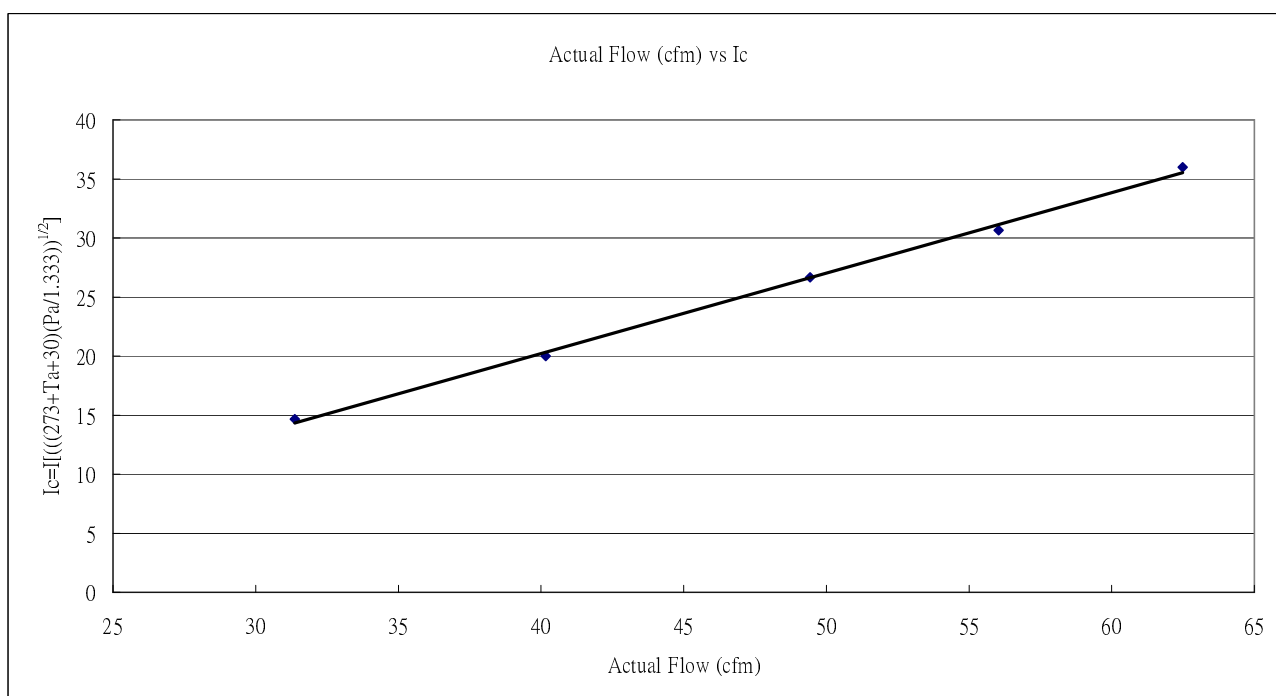
Brush

Changing time

Type : RSP

Plate No.	Ind (cfm)	Ture "H ₂ O	Ic	Actual (cfm)
18	54	11.8	36	62
13	46	9.5	31	56
10	40	7.4	27	49
7	30	4.9	20	40
5	22	3	15	31
Set	30			40

Calibrator : CM-AIR-43

Slope (m) = 0.681141Y-intercept (b) = -7.029679Regression (r)= 0.998843
coefficient

1. Linear regression : Actual Flow = Indicated Flow * Slope(m) + intercept(b)
2. Regression coefficient:(r)= 0.998843
3. If (r) < 0.99 calibration should be performed again.
4. Ic=continuous flow recorder readings corrected to current Ta and Pa
5. I=indicated flow readings

Calibration Data For High Volume Sampler (RSP)

Date : 26-Jul-05 Temp. : 31

Sampler Code : CM-AIR-117

Client : ERM Press. : 1002

Name

Int. Clock : 4492

Operator : Y C Pang

Carbon :

Location : Peng Chau

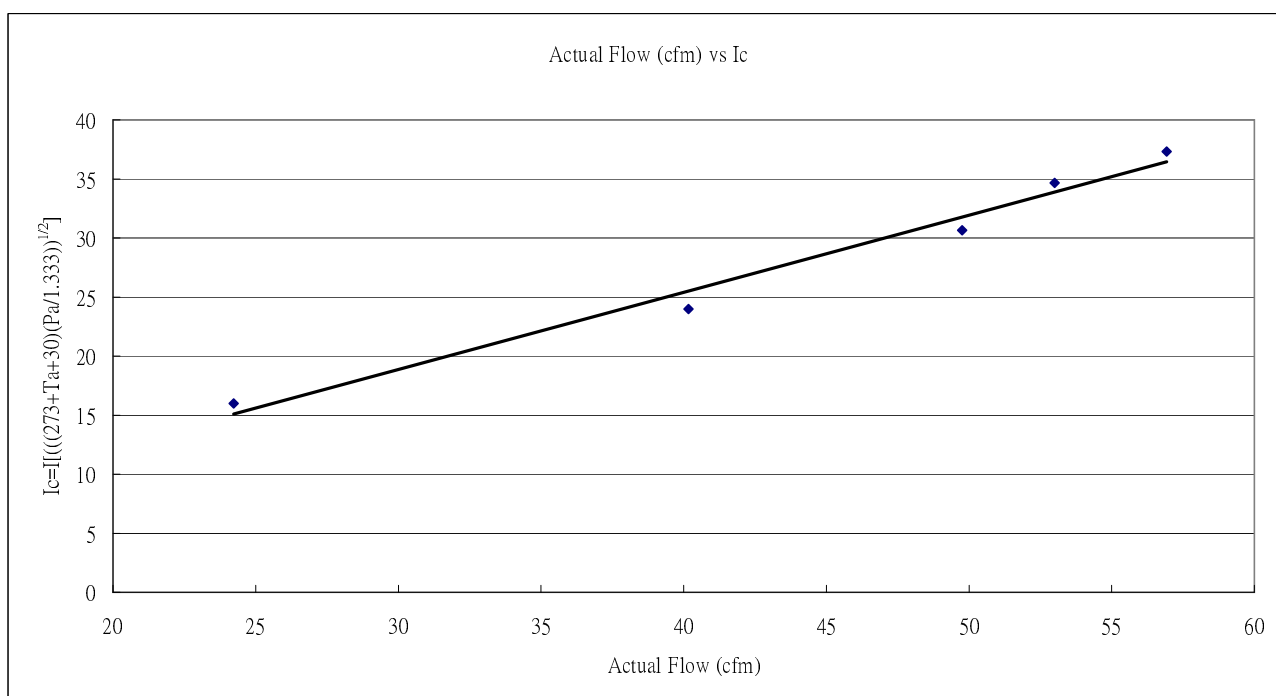
Brush

Changing time

Type : RSP

Plate No.	Ind (cfm)	Ture "H ₂ O	Ic	Actual (cfm)
18	56	9.8	37	57
13	52	8.5	35	53
10	46	7.5	31	50
7	36	4.9	24	40
5	24	1.8	16	24
Set	38			40

Calibrator : CM-AIR-43

Slope (m) = 0.653180Y-intercept (b) = -0.743861Regression (r)= 0.990371
coefficient

1. Linear regression : Actual Flow = Indicated Flow * Slope(m) + intercept(b)
2. Regression coefficient:(r)= 0.990371
3. If (r) < 0.99 calibration should be performed again.
4. Ic=continuous flow recorder readings corrected to current Ta and Pa
5. I=indicated flow readings

Calibration Data For High Volume Sampler (RSP)

Date : 26-Jul-05 Temp. : 33

Sampler Code : CM-AIR-034

Client : ERM Press. : 1004

Name

Operator : Y C Pang

Int. Clock : 3375

Location : Discovery Bay

Carbon : 3757

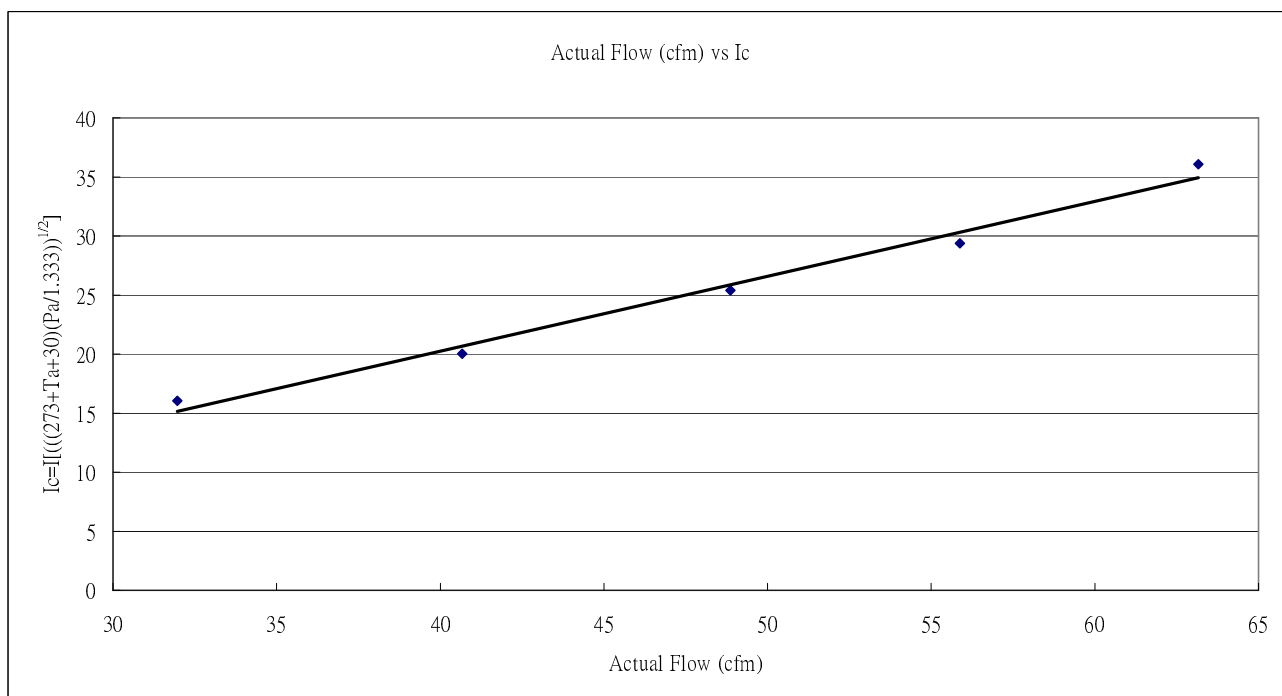
Brush

Changing time

Type : RSP

Plate No.	Ind (cfm)	Ture "H ₂ O	Ic	Actual (cfm)
18	54	12	36	63
13	44	9.4	29	56
10	38	7.2	25	49
7	30	5	20	41
5	24	3.1	16	32
Set	30			40

Calibrator : CM-AIR-43

Slope (m) = 0.634191Y-intercept (b) = -5.129095Regression (r)= 0.992777
coefficient

1. Linear regression : Actual Flow = Indicated Flow * Slope(m) + intercept(b)
2. Regression coefficient:(r)= 0.992777
3. If (r) < 0.99 calibration should be performed again.
4. Ic=continuous flow recorder readings corrected to current Ta and Pa
5. I=indicated flow readings

Calibration Data For High Volume Sampler (RSP)

Date : 26-Jul-05 Temp. : 33

Sampler Code : CM-AIR-027

Client : ERM Press. : 1004

Name

Operator : Y C Pang

Location : Discovery Bay

Type : RSP

Int. Clock : 1257

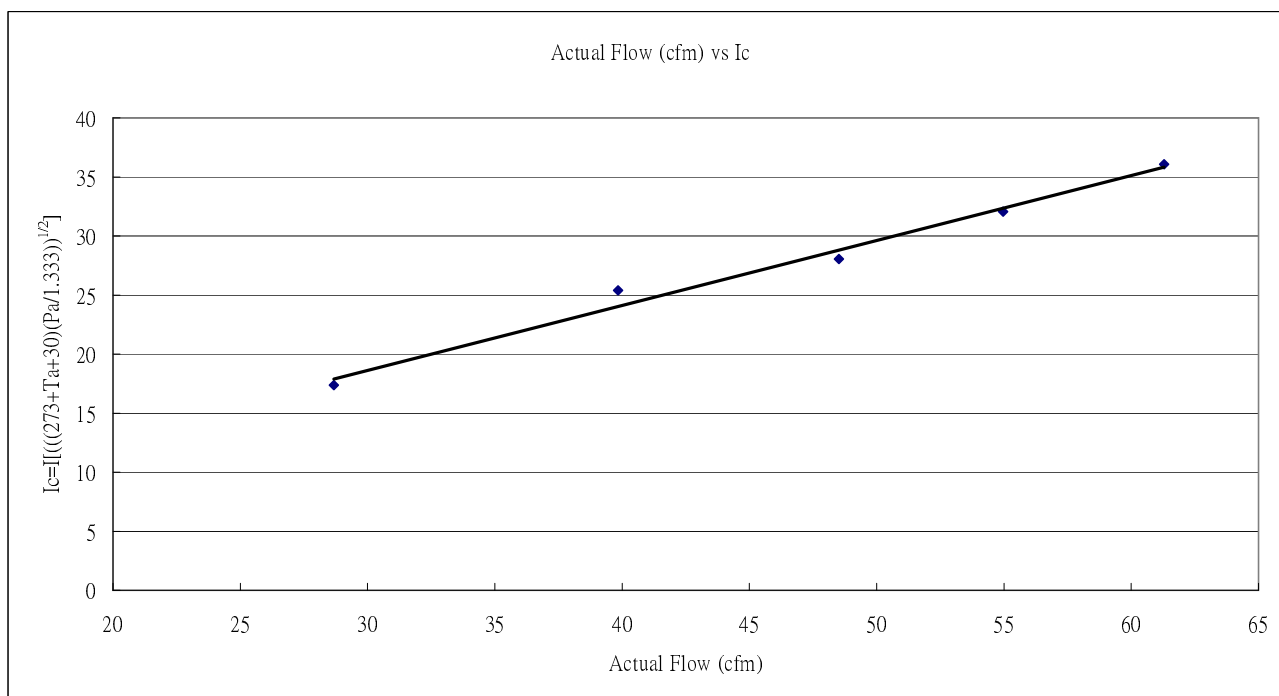
Carbon : 1707

Brush

Changing time

Plate No.	Ind (cfm)	Ture "H ₂ O	Ic	Actual (cfm)
18	54	11.3	36	61
13	48	9.1	32	55
10	42	7.1	28	49
7	38	4.8	25	40
5	26	2.5	17	29
Set	36			40

Calibrator : CM-AIR-43

Slope (m) = 0.549938Y-intercept (b) = 2.124962Regression (r) = 0.993018
coefficient

1. Linear regression : Actual Flow = Indicated Flow * Slope(m) + intercept(b)
2. Regression coefficient:(r)= 0.993018
3. If (r) < 0.99 calibration should be performed again.
4. Ic=continuous flow recorder readings corrected to current Ta and Pa
5. I=indicated flow readings