

**Ocean Park Master Redevelopment Project**

**EP-249/2006/A – Condition 3.4**

**Monthly EM&A Report – August 2011**

Certified by



on 20-Sep-11

Lindsay Pickles (ETL)

Verified by Independent Environmental Checker on 21-Sep-11

IEC Certificate attached in the submission? Yes

**Ocean Park Master Redevelopment Project**

**Environmental Permit No. EP-249/2006/B - Condition 3.4**

**Monthly EM&A Report – August 2011**

**Submitted by Ocean Park Corporation on 20-09-2011**

**This is to verify that**

**Monthly EM&A Report – August 2011**

**Submitted by Ocean Park Corporation**

**On 20-09-2011**

**Has been verified by the undersigned.**

Signed



Dr Anne F Kerr  
Independent Environmental Checker (IEC)  
Retained by Ocean Park Corporation  
pursuant to Environmental Permit No. EP-249/2006/B

Date

21 September 2011



# Ocean Park Master Redevelopment Project

## Monthly Environmental Monitoring & Audit Report – August 2011



## Table of Content

### Part 1 Project Overview

#### Executive Summary

1.	Introduction.....	3
2.	Project Organisation .....	4
3.	Construction Works Undertaken during the Reporting Month .....	4
4.	Permits and License Status.....	5
4.1	ENVIRONMENTAL PERMIT.....	5
4.2	CNP .....	5
4.3	OTHER PERMITS & LICENSES .....	6
5.	EP Submissions Status.....	6
6.	Materials Management .....	7
7.	Environmental Monitoring and Results.....	7
7.1	MONITORING REQUIREMENTS.....	7
7.1.1	CONSTRUCTION MONITORING .....	7
7.2	MONITORING RESULTS .....	9
7.2.1	CONSTRUCTION MONITORING RESULTS.....	9
7.2.2	OPERATIONAL STAGE MONITORING FOR OCEAN PARK SYMBIO SHOW .....	10
8.	Site Audit .....	11
8.1	IEC SITE AUDIT .....	11
8.2	NON- COMPLIANCE.....	12
9.	Implementation status of Environmental Mitigation Measures.....	12
10.	Summary of Complaint, Summon or Prosecution .....	12
11.	Future Issues.....	12
12.	Conclusion and Recommendation.....	13
12.1	CONCLUSION .....	13
12.2	RECOMMENDATION .....	13

#### Appendix A IEC's Site Inspection Records

Part 2	CS-03 EM&A Monthly Report
Part 3	Ocean Park Symbio Show 6th Monthly Monitoring Report
Part 4	7 <sup>th</sup> Coral Monitoring Survey



## Part 1 Project Overview

### Executive Summary

This is the combined monthly EM&A Report for Ocean Park Master Redevelopment Project, which includes CS03 "Thrill Mountain and Polar Adventure" under Part 2. This report presents the results of EM&A works conducted in the reporting month of August 2011 (from 26 July 2011 to 25 August 2011) for construction works and in the reporting month of July (27 June 2011 to 26 July 2011) for Operational Monitoring.

Construction works at the Entry Plaza, Aqua City and Grand Aquarium under CI07 have been completed in January 2011 and, as advised to EPD on 1 April (PD/PW/GOV/151/006107), no further construction monitoring will be undertaken.

Construction works at the Summit, CS02 for the Rainforest have been completed in April 2011.

At the Summit, Contract CS03, for the Thrill Mountain and Polar Adventure, is still underway. Other than ongoing Coral Survey, there will be no construction monitoring undertaken. The audits will continue to be carried out by the Contractors ET and OPC's ET and verified by the IEC.

The Report for the Coral Monitoring Survey for August 2011 is included in part 4 of this Report

Environmental monitoring for the Park's Operations has commenced upon the opening of Aqua City and with the commencement of the Symbio Show on 27 January 2011. The 6th Air Quality and Noise Monitoring Report for the Ocean Park Symbio Show is included in this report under Part 3.

No complaint, non-compliance from IEC, summons or prosecution related to environmental issues was made against the Ocean Park Master Redevelopment Project in the reporting period of August 2011 and in the reporting month of July (27 June 2011 to 26 July 2011) for Operational Monitoring.

**1. Introduction**

The "Master Redevelopment Project of Ocean Park" (hereinafter known as the "Project") is implemented by the Ocean Park Corporation at its existing site of Ocean Park and Nam Long Shan, Aberdeen. The Project involves both reconstruction/modification of existing facilities and expansion of the Park under Environmental Permit, EP-249/2006/B.

The construction works of the project consists of various contracts. Details of the contracts, which are required to perform the EM&A programme, are shown below.

<b>Contract No.</b>	<b>Contract Title</b>	<b>Contractor</b>	<b>Construction Commencement</b>
CI-05	Site Formation, Funicular Tunnel and Miscellaneous Works	Dragages-Bouygues JV	12 March 2007 and Construction phase has ceased in early June 2009
CS-01	Back of House for Marine Mammal Veterinary Hospital	Kaden – ATAL JV	26 March 2007 and Construction phase has ceased in mid-October 2008
CW-02	Astounding Asia	W. Hing Construction Co. Ltd.	1 August 2007 and Construction phase has ceased in mid-February 2010
CI-07	Entry Plaza, Aqua City and Grand Aquarium	Leighton Contractors (Asia) Ltd.	15 August 2008 and Construction Phase has ceased in January 2011
CS-02	Rainforest	W. Hing Construction Co. Ltd.	11 May 2009 and construction has ceased in April 2011
CS-03	Thrill Mountain and Polar Adventure	Kaden – ATAL JV	2 November 2009

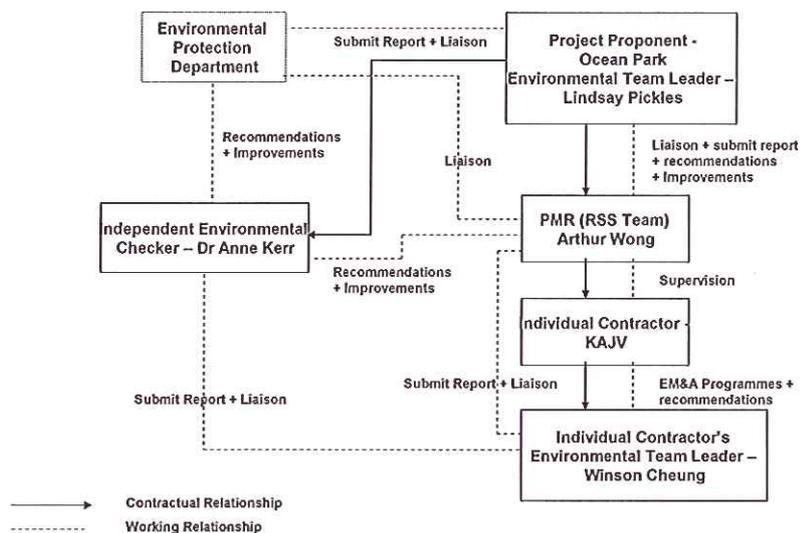
The Contractors conduct environmental audits during the construction stage and produce contract specific monthly EM&A reports. This is the combined monthly EM&A Report including the IEC audit findings, CS03 Monthly EM&A Report, and the Operational Monitoring Report for the Ocean Park Symbio Show.

This report presents the results of EM&A works conducted in the reporting month of August 2011 (from 26 July 2011 to 25 August 2011) for construction works and in the reporting month of July 2011 (27 June 2011 to 26 July 2011) for Operational Monitoring.

## 2. Project Organisation

The structure of the environmental management team is shown in below figure.

Figure 1.1 – Management Organisation



## 3. Construction Works Undertaken during the Reporting Month

In the reporting month, the construction activities are summarised as follows.

### CI-05

- Construction phase has ceased in early June 2009.

### CS-01

- Construction phase has ceased in mid-October 2008.

### CW-02

- Construction phase has ceased in mid-February 2010.

### CI-07

- Construction phase has ceased in January 2011.

### CS-02

- Construction phase has ceased in April 2011.

### CS-03

- Construction of Tuxedos Restaurant at South Pole;
- Finishing works of Bobsled Station superstructure and installation of rides;
- Erection of structure steel works for Thrill Mountain;
- Finishing works at Thrill Mountain;
- Carry out wall finishing works for PA Building;
- Theme works at PR Building;
- Finishing works at Floorless Coaster Station;
- Wet trade work at Floorless Coaster;
- Apply waterproofing at roof of Floorless Coaster;
- Installation of theme works and
- Disposal Existing Stockpile.

#### 4. Permits and License Status

##### 4.1 Environmental Permit

The Environmental Impact Assessment (EIA) Report of the Project has been approved by the Environmental Protection Department (EPD) (Register No.: AEIAR-101/2006) on 12 July 2006. Subsequently, EPD issued Environmental Permit (EP) for the construction and operation of the project. Table below is a full list of the EPs.

EP No.	Issue Date	Key Variation
EP-249/2006	28 July 2006	First EP
EP-249/2006/A	25 September 2006	<ul style="list-style-type: none"> <li>Enhance the roosting habitat for freshwater birds by enlarging Pond 35 and its surrounds with a total area of no less than 120 squares meters and no construction works and discharge from construction sites shall be allowed within Pond 35 after enhancement.</li> <li>Filling of Pond 37 at the Lowland Area.</li> <li>Submission of the as-built drawings showing the enhancement works of Pond 35.</li> </ul>
EP-249/2006B	3 November 2010	<ul style="list-style-type: none"> <li>Total sound power level of all loudspeaker clusters shall not exceed 109 db(A) and the sound pressure level at 9m away from each loudspeaker cluster shall not exceed 75 db(A).</li> <li>Submit noise review study.</li> <li>Submit detail design of night time functional and thematic lighting.</li> <li>Trial pyrotechnical special effects materials display and submit air quality sampling plan.</li> </ul>

##### 4.2 CNP

Table below shows a list of CNP within the reporting month.

Permit No.	Starting Date	Expired Date	Validity	Location	Contract No.	Status
<b>CS-03 (KAJV)</b>						
GW-RS0516-11	9-June-11	30-Nov-11	Various	Top of Nam Long Shan Road	CS03	Valid

#### 4.3 Other Permits & Licenses

Tables below show lists of other permits & license for individual contracts.

##### CS-03

Permit/Ref/No	Valid Period		Section	Status
<b>Notification of Construction Work under APCO</b>				
311433	N/A	N/A	Thrill Mountain and Polar Adventure	Valid
<b>Water Discharge License</b>				
WT00005926-2010	12-Feb-10	28-Feb-15	Thrill Mountain and Polar Adventure	Valid
<b>Registration as Chemical Waste Producer</b>				
WPN5213-176-K2880-02	25-Nov-09	N/A	Thrill Mountain and Polar Adventure	Registered
<b>Construction Waste Disposal Billing Account with EPD</b>				
7009695	N/A	N/A	Thrill Mountain and Polar Adventure	Issued

#### 5. EP Submissions Status

Environmental submissions to EPD since the commencement of construction works at Ocean Park, i.e. from 12 March 2007 to 25 August 2011 are as below.

Contract	Submissions
CI-05	<ul style="list-style-type: none"> <li>• Notification of Commencement Date</li> <li>• Management Organisation Chart</li> <li>• Construction Programme</li> <li>• Drainage Proposal</li> <li>• Silt Curtain Proposal</li> <li>• Waste Management Plan</li> <li>• Baseline Air Quality and Noise Monitoring Report</li> <li>• Transplantation Proposal for Uncommon Species</li> <li>• Baseline Coral Survey Report</li> <li>• As-built Drawings of Pond 35</li> <li>• Detailed Compensatory Planting As-built Drawing</li> </ul>
CS03	<ul style="list-style-type: none"> <li>• Monthly EM&amp;A Report (July 2011)</li> </ul>
City Bus Limited	<ul style="list-style-type: none"> <li>• Written Notice on Completion of TPH Contaminated Soil Disposal</li> <li>• Written Notice on Completion of Solidification Treatment of Heavy Metals Contaminated</li> <li>• As-built Remediation Plan</li> </ul>
Hong Kong School of Motoring Ltd.	<ul style="list-style-type: none"> <li>• Confirmation Letter to confirm that Land Contamination remediation Works within HKSM has been completed</li> </ul>
Environmental Permit Conditions	<ul style="list-style-type: none"> <li>• Noise Review Study Report</li> <li>• Glare impact Assessment report</li> <li>• Air Quality Sampling Plan</li> </ul>

**6. Materials Management**

Section 6.17 in the EIA report specified the disposal of materials to the public fill reception facilities should be considered as last resorts with the preferred approach to reuse the material within the project and/or other projects.

The amounts of different types of materials generated by the activities of the Project in the month are shown in following table. The total materials quantities of the project showed that the reuse of materials was maximized and the disposal to the public filling facilities was minimized. Mitigation measures under the Waste Management Plan (WMP) revision D have been implemented during the reporting period.

Materials Type	Disposal Locations	CS-03	Total
C&D Waste	SENT	266.70 Tonnes	266.70 tonnes
	TKOSF	--	-
	TMSF	--	-
C&D Material	CWPFBP	261.80 Tonnes	261.80 tonnes
	TKOFB	--	-
Chemical Waste	Collected by licensed collector	0 Litres	0 litres
General Waste	Collected by licensed collector	--	-

**7. Environmental Monitoring and Results**

**7.1 Monitoring Requirements**

Under EP-249/2006/B condition 3.2, impact environmental monitoring including sampling, measurements and necessary remedial action should be conducted in accordance with the requirements of the EM&A Manual, which has been updated to include operational monitoring of the Ocean Park Symbio Show.

**7.1.1 Construction Monitoring**

Construction works at the Entry Plaza, Aqua City and Grand Aquarium under CI07 have been completed in January 2011 and, as advised to EPD on 1 April 2011 (PD/PW/GOV/151/006107), no further construction monitoring will be undertaken.

One contract at the Summit, CS03 for the Thrill Mountain and Polar Adventure is still underway. However, other than ongoing Coral Survey, no construction monitoring will be undertaken for these works, only auditing works. The audits will continue to be carried out by the Contractors ET, certified by the OPC's ET and verified by the IEC.

**Terrestrial Ecology**

Monitoring of the health and condition of the transplanted plant species of conservation interest should be conducted at least once a month during the first 12 month after transplantation. Proposed monitoring location would be next to the Contract CI-05 site office.

**Coral**

The locations of the coral monitoring stations are presented in the table below.

<b>Coral Impact Monitoring Stations</b>	<b>Identity/Description</b>
Site 1	Seaside near the Lowland
Site 2 to Site 5	Around Headland
Control Station	Between Near Round Island and Chung Hom Kok

**Ocean Park Symbio Show**

Operational Stage Monitoring for Ocean Park Symbio Show for Environmental Monitoring for the Symbio Show commenced on the 27 January 2011.

Air Quality monitoring was conducted at the agreed designated air quality monitoring station (AQMS) located at locations as presented in the Table below.

<b>AQMS ID</b>	<b>Location</b>	<b>Sampling Height (m above ground)</b>
AM1	Rooftop of Administrative Building (former Staff Quarter) in Ocean Park	10
AM2	Landscape Storage Area in Ocean Park	3
AM3	Rooftop of Main Medical Block of Graham Hospital	20

One 24-hr average RSP sample was collected on each scheduled day for monitoring by a High Volume Sampler (HVS) following the USEPA method, EPA IO-2.1. Calibration of the equipment has followed the requirements set out in EPA IO-2.1.

Noise monitoring was conducted at five designated noise monitoring locations in accordance with the approved EM&A Manual. Alternative noise monitoring had been proposed because of accessibility problem, as set out in the Table below.

Monitoring Noise Monitoring Stations	Description	Location	With or without Façade Correction
AON1	Open Area adjacent to Police Training School	1.2m above street level	Without façade correction
AON2	Old canteen building, Ocean Park	1.2m above street level	With façade correction
AON3	Woodgreen Estate	1.2m above street level near the entrance gate	With façade correction
AON4	Manly Villa	1.2m above street level near the entrance	With façade correction
AON5	Hau Yuen	1.2m above street level outside boundary wall	With façade correction

Six consecutive measurements of LAeq, 5 min reading were carried out to calculate the LAeq, 30 min noise level during the Lagoon Show.

Six consecutive measurements of LAeq, 5 min reading were carried out to calculate the LAeq, 30 min noise level before the lagoon night show, ie during daily operation of the Ocean Park without the Lagoon Show.

Three consecutive measurements of LAeq, 5 min reading were carried out to calculate the LAeq, 15 min noise level after the lagoon night show, ie without operation of the Ocean Park to establish the background noise levels.

Any significant influencing factors on the measured noise levels were taken into account in accordance with standard acoustical principles and practices. The corrected noise level due to the lagoon night show and the operation of Ocean Park was computed based on the background noise level and measured noise level.

## 7.2 Monitoring Results

### 7.2.1 Construction Monitoring Results

#### Terrestrial Ecology

According to the requirement in the EM&A Manual, the monitoring of transplanted plants at the receptor has been completed in August 2008.

#### Coral

The 7th coral monitoring survey, after the Coral Re-tagging exercise in November 2009, was conducted on 27 August 2011. The monitoring survey showed that the

change in level of sedimentation on the tagged colonies was minor. No increment in level of bleaching or partial mortality suggested that all tagged corals were in good condition and healthy in all the 5 Monitoring Sites 1 to 5 and the Control Site C. Neither action/limit level of sedimentation, bleaching or mortality was exceeded. Hence no adverse impact by the construction activity on the coral community was evidenced.

### 7.2.2 Operational Stage Monitoring for Ocean Park Symbio Show

The report on the impact monitoring results for the open-air night show, which commenced on 27 January 2011, is provided at Part 3 of this report.

For Air Quality Monitoring, 24-hr average Respirable Suspended Particulates (RSP) monitoring was conducted at a designated monitoring station on the rooftop of the Administrative Building in OP (AM1) for the Landscape Storage Area (AM2), and the Roof top of the Main Medical Block of Graham Hospital (AM3) on 22 July 2011.

No exceedance of A/L Level is monitored during the reporting period.

Monitoring Location	Monitoring Date	24-hr RSP Concentration ( $\mu\text{gm}^{-3}$ )	Action/Limit Level ( $\mu\text{gm}^{-3}$ )
AM1 (Rooftop of Administrative Building (Old Staff Quarters in Ocean Park))	22 July 2011	26	180
AM2 (Landscape Storage Area)	22 July 2011	26	180
AM3 (Roof top of the Main Medical Block of Graham Hospital)	22 July 2011	26	180

Noise Monitoring results indicated that the background corrected Lagoon Night Show Noise Levels have complied with the Limit Levels at all monitoring stations during all monitoring dates.

The background corrected Noise Levels have complied with the Limit Levels at most of the monitoring stations during most of the monitoring dates. Noise exceedances were recorded at AON1 (Open Area adjacent to Police Training School) due to high background noise from the visitors and traffic during public holidays and at AON3 (Woodgreen Estate) due to the traffic noise from Shouson Hill Road. Details are provided in the summary table below.

## Summary of Daily Operational Noise Exceedance during this Reporting Period

Date	Noise Monitoring Station	Measured Noise Level, dB(A)		Daily Operational Noise Level (Background Corrected) <sup>(a)</sup> , Leq (30 min) dB(A)	Limit Level, Leq (30 min) dB(A)
		Daily Operational Noise Level, Leq (30 min) dB(A)	Background Noise Level, Leq (15 min) dB(A)		
26 June 2011 (Public Holiday)	AON1	66.3	65.2	62.6	60
30 June 2011 (Weekday)	AON3	64.3	63.4	56.9	55
3 July 2011 (Public Holiday)	AON1	64.9 (Night Show noise level)	63.8	61.6 (Night Show noise Level (Background Corrected))	60
8 July 2011 (Weekday)	AON3	65.2	64.1	58.7	55
12 July 2011 (Weekday)	AON3	66.5	64.1	62.9	55
		65.2 (Night Show Noise Level)	64.1	58.8 (Night Show Noise Level (Background Corrected))	55
19 July 2011 (Weekday)	AON3	65.3 (Night Show Noise Level)	64.5	57.5 (Night Show Noise Level (Background Corrected))	55

## Note :

(a) The Background corrected Noise Levels were either measured in front of a façade at AON2, AON4 and AON5 or with façade correction of 3dB(A) at AON1 and AON3.

## 8. Site Audit

### 8.1 IEC Site Audit

IEC conducted monthly site audit on CS-03 on 25 August 2011. Audit checklists are attached in Appendix A of Part 1.

**CS-03 Observations:**

- Stagnant water was accumulated on site after heavy rain. The Contractor was reminded to remove the stagnant water as soon as possible.
- A few drums with hydraulic vegetable oil were placed on bare ground. The Contractor indicated that the oil will be used for installation works and any oil drums not used will be placed in permanent storage area
- The Contractor was reminded to dispose surplus C&D material to public fill as soon as possible;
- The Contractor was recommended to maintain the silt curtain regularly and properly.

**8.2 Non- Compliance**

No non-compliances were recorded in August 2011.

**9. Implementation status of Environmental Mitigation Measures**

Please see Part 2, of this Report for the individual contractual reports for the details of the implementation of environmental mitigation measures.

**10. Summary of Complaint, Summon or Prosecution**

No complaint, summon or prosecution was recorded in the reporting month.

**11. Future Issues**

Key Issues to be considered in the coming month include:

**CI-05**

- Construction phase had ceased in early-June 2009.

**CW-02**

- Construction phase had ceased in mid-February 2010.

**CS-02**

- Construction phase had ceased in April 2011.

**CS-01**

- Construction phase had ceased in mid-October 2008.

**CI-07**

- Construction phase had ceased in January 2011.

**CS-03**

- Remove waste more frequently.
- Ensure drip tray to be provided for oil drum.
- Ensure water spray on haul road to avoid dusty environment.
- Ensure stockpile materials to be covered by tarpaulin or other means.
- Ensure stagnant water is removed promptly after heavy rain.

## 12. Conclusion and Recommendation

### 12.1 Conclusion

No non-compliance from IEC, complaint, summons or prosecution related to environmental issues was made against the Ocean Park Master Redevelopment Project in the reporting period of August 2011.

Daily operational noise and lagoon night show noise monitoring were carried out at five designated monitoring stations during this reporting period. Out of the 5 stations, noise exceedances were recorded at AON1 (Open Area adjacent to Police Training School) due to high background noise from the visitors and traffic during public holidays, and from AON3 (Woodgreen Estate)) due to the traffic noise from Shouson Hill Road.

### 12.2 Recommendation

According to the environmental audit performed in the reporting month, the following recommendations are made:

#### Air Quality Impact

- To prohibit any open burning on site.
- To regular maintain the machinery and vehicles on site.
- To implement dust suppression measures on dry surfaces.

#### Noise Impact

- To inspect the noise sources from inside and outside of the site.
- To space out noisy equipment and position as far away as possible from sensitive receivers.
- To have regular maintenance of vessels and equipment used.

#### Water Quality Impact

- To minimize water discharge runoff into nearby water body.
- To treat site surface runoffs and wastewater generated from various construction activities with wastewater treatment system (comprised of chemical coagulation, sedimentation and pH control)
- To review and implement temporary site drainage management plan.
- Silt removal facilities, channels, manholes and wastewater treatment system should be frequently cleaned the deposited silt and grit to maintain in proper condition.
- To review the adequacy of the desilting facilities' capacity.

#### Waste/Chemical Management

- To check for any accumulation of waste materials or rubbish on site.
- To avoid any discharge of chemical waste or oil directly from the site.
- To regularly and properly collect, store and dispose of all waste types, including floating refuses around the silt curtain.

**Operational Stage Monitoring for Ocean Park Symbio Show**

Recommendation has been given to continue with noise monitoring at the same stations using the same frequency and approach during the second to the twelfth months of the operation of the open-air night show.

To satisfy potentials concerns over RSP concentrators, the number of monitoring stations has been increased to a total of 3 monitoring stations. As the monitored results remain within the AQO, the frequency remains reduced to monthly.

**Appendix A**

**Part 1 Independent Environmental Checker's Site Inspection Records**

**Ocean Park Master Redevelopment Project**  
**Contract P007**  
**Independent Environmental Checker**  
**MONTHLY SITE INSPECTION CHECKLIST**

Inspection Date	25/08/2011	Time	15:30	Inspected By	EM: L. Pickles IEC: Florence Yuen Contractor: CS03: J. Tam
Site Location	GS03				

**Weather**

Condition	<input type="checkbox"/> Sunny	<input checked="" type="checkbox"/> Fine	<input type="checkbox"/> Overcast	<input type="checkbox"/> Drizzle	<input type="checkbox"/> Rain	<input type="checkbox"/> Storm	<input type="checkbox"/> Hazy
Temperature	33°C		Humidity	<input type="checkbox"/> High	<input checked="" type="checkbox"/> Moderate	<input type="checkbox"/> Low	
Wind	<input checked="" type="checkbox"/> Calm	<input type="checkbox"/> Light	<input type="checkbox"/> Breeze	<input type="checkbox"/> Strong	Direction <input style="width: 100px;" type="text"/>		

		Close-out on last comments Y/N	N/A or not obs	Yes	No	Photo/Remarks
<b>Construction Noise</b>						
S2.18	Is a valid Construction Noise Permit (CNP) obtained for works during restricted hours?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
S2.26	<b>Good Site Practices:</b>					
	• Are the operating plants well-maintained and serviced regularly?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	• Are silencers or mufflers utilized on construction equipment? Are they properly maintained?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	• Is the mobile plant sited far enough from NSRs?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	• Are intermittently used machines and plants shut down between work periods?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	• Is the plant known to emit noise strongly in one direction, if any, oriented to direct noise away from the NSRs?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Is the stockpile or other structures utilized effectively, wherever practicable, in screening noise from the works?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
S2.27	Are suitable quiet plants adopted?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
S2.28	Are movable barriers used for both movable PME and stationary PME?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
S2.29	Do the screening materials used achieve the predicted noise reduction?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
S2.30	Are the noisy works avoided during examination period of the nearby school?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Blasting Noise</b>						
S2.32	• Are the NSRs informed of the blasting work in advance?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Is sufficient time allowed for alerting all the potential NSRs prior to every blasting work?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

- Are proper procedures put in place to alert and minimise any startling effect on the staff working in Ocean Park? 

	✓		
--	---	--	--
- Is the optimal amount of charge used evaluated for noise reduction? 

	✓		
--	---	--	--

**Landscape and Visual**

- S3.10 Consideration on existing surrounding vegetation:
- Are temporary tree nurseries set up? 

	✓		
--	---	--	--
  - Is "no-intrusion zones" implemented? 

	✓		
--	---	--	--
  - Is the existing vegetation protected from damage? 

		✓	
--	--	---	--
  - Are hill fire prevention measures taken? 

		✓	
--	--	---	--
  - Is dust and erosion controlled for exposed soil? 

		✓	
--	--	---	--
  - Are the irrigation networks set up throughout the Establishment Period? 

	✓		
--	---	--	--
  - Is Quarterly Report on existing trees to be retained or transplanted prepared by the Contractor? 

	✓		
--	---	--	--

- S3.11 Consideration on appearance and view:
- Is the appearance of hoardings suitable? 

		✓	
--	--	---	--
  - Is the appearance of construction workers, plants/machines suitable? 

		✓	
--	--	---	--
  - Are the screening and alignment of the temporary barging point and conveyor system suitable? 

	✓		
--	---	--	--
  - Are the selected security floodlights suitable? 

	✓		
--	---	--	--

**Ecology**

- S4.5 Transplantation:
- Is the transplantation work supervised by a qualified botanist/horticulturalist in the ET? 

		✓	
--	--	---	--
  - Are the transplanted plant species of conservation interest monitored during the first 12 months after transplantation? 

		✓	
--	--	---	--

- S4.7 Construction:
- Is the runoff entering watercourses avoided by control measure, especially during heavy rain? 

		✓	
--	--	---	--
  - Is the site runoff directed to regularly cleaned and maintained silt traps (or oil separators)? 

		✓	
--	--	---	--
  - Are sediment traps included in drainage to collect and control construction run-off? 

		✓	
--	--	---	--
  - Is suitable size silt traps or oil interceptor used? 

		✓	
--	--	---	--
  - Is vegetation survey carried out to determine the feasibility and suitability of individual plants for transplantation? 

		✓	
--	--	---	--
  - Are the trees located within the works area preserved suitably? 

		✓	
--	--	---	--
  - Are individual plants of conservation interest transplanted prior to the construction phase? 

		✓	
--	--	---	--
  - Are the equipments and stockpiles placed in designated works areas and access routes selected on existing disturbed land to minimise disturbance to natural habitats? 

		✓	
--	--	---	--

- Are construction activities restricted to the work areas demarcated? 

		✓	
--	--	---	--
- Are waste skips provided to collect general refuse and construction wastes? 

		✓	
--	--	---	--
- Are the wastes disposed of timely and properly off-site? 

		✓	
--	--	---	--
- Is open burning on works sites prohibited? 

		✓	
--	--	---	--
- Are native plant species made use of as far as possible on newly formed land? 

		✓	
--	--	---	--

**Construction Waste**

S5.4

**Good Site Practices**

- Are arrangements made for collection and effective disposal of all wastes generated? 

		✓	
--	--	---	--
- Are the waste management and chemical handling procedures followed? 

		✓	
--	--	---	--
- Are sufficient waste disposal points provided? 

		✓	
--	--	---	--
- Are the wastes disposed of regularly? 

		✓	
--	--	---	--
- Are appropriate measures taken to minimise windblown litter and dust during transportation of waste by either covering trucks or transporting wastes in enclosed containers? 

		✓	
--	--	---	--
- Are the drainage systems, sumps and oil interceptors regularly cleaned and maintained? 

		✓	
--	--	---	--

S5.5

**Waste Reduction Measures:**

- Is the C&D waste from demolition and decommissioning of existing facilities sorted to recover recyclable materials? 

		✓	
--	--	---	--
- Are different types of wastes segregated and stored in different containers, skips or stockpiles to enhance reuse or recycling and the proper disposal? 

		✓	
--	--	---	--
- Are aluminium cans segregated in labelled bins and collected by individual collectors for recycling? 

		✓	
--	--	---	--
- Are proper storage and site practices maintained to minimise the potential for damage or contamination of construction material? 

		✓	
--	--	---	--
- Are the construction materials planned and stocked carefully to avoid unnecessary generation of waste? 

		✓	
--	--	---	--

S5.7

**General Refuse**

- Is the general refuse stored in enclosed bins or compaction units separate from C&D material? 

		✓	
--	--	---	--
- Is the general refuse removed regularly by a waste collector? 

		✓	
--	--	---	--

S5.8

**C&D Material**

- Are the excavated materials from site formation of the expansion areas and tunnel construction for the funicular system reused on-site as backfilling material and for landscape works? 

		✓	
--	--	---	--
- Are the surplus rock and other inert C&D material disposed of at the public fill sites? 

			✓
--	--	--	---

 ② P1130730
- Is a waste management plan prepared? 

		✓	
--	--	---	--
- Is a recording system present for the record of amount of wastes generated, recycled and disposed? 

		✓	
--	--	---	--

	• Is the trip-ticket system required in ETWB TCW No.31/2004 followed on site?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
S5.9	<b>Chemical Wastes</b> Is chemical wastes generated from the works? And if yes,	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	• Is the Contractor registered as a Chemical Waste Producer?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	• Are good quality containers used for separating and storing chemical wastes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	② P1130727
	• Are appropriate labels securely attached on each chemical waste container to indicate their corresponding chemical characteristics?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	• Is the Contractor licensed to transport and dispose of the chemical wastes?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	<b>Land Contamination</b>					
S6.11	• Is the contact of construction workers with contaminated materials minimised by using bulk earth-moving excavator equipment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Are appropriate cloth, personal protective equipment, hygiene and washing facilities provided to minimise exposure to any contaminated material?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Is stockpiling of contaminated excavated materials avoided?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Is the use of contaminated soil for landscaping without proper treatment prohibited?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Are vehicles containing excavated materials covered properly to limit potential dust emissions or contaminated wastewater runoff?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Is the speed of the trucks carrying contaminated materials controlled?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Are the necessary waste disposal permits obtained from appropriate authorities in according with Waste Disposal (Chemical Waste) (General) Regulation?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Are silt removal facilities provided with retention time for silt/sand traps of 5 minutes under maximum flow conditions?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
S6.12	<b>Remediation Process</b>					
	• Is biopile covered by tarpaulin or low permeable sheet to avoid dust emission?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Is vented air from biopile treated by blower and carbon adsorption system before released to the atmosphere?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Are the materials which may generate airborne dust emissions adequately wetted prior to and during the loading, unloading and handling operations?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Are silencers installed at biopile blower to minimise noise impact?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Are quiet plants such as generator and blower used for biopile?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	• Are the mixing process and other associated material handling activities properly scheduled to minimise potential noise impact?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
• Are Impermeable liners placed at the bottom of biopile?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

- Is leachate collection sump construction along the perimeter of biopile? 

	✓		
--	---	--	--
- Is the leachate recycled back to the biopile or truck away to Chemical Waste Treatment Centre for disposal? 

	✓		
--	---	--	--
- Is the mixing of contaminated soils and cement/water/other additive(s) undertaken at a solidification plant to minimise the potential for leaching? 

	✓		
--	---	--	--
- Is a concrete bund construction along the perimeter of the solidification/stabilisation area to prevent runoff? 

	✓		
--	---	--	--
- Are the loading, unloading, handling, transfer and storage of cement carried out in an enclosed system? 

	✓		
--	---	--	--
- Are the contaminated soils transported by roll-off trucks (contrainersation)? 

	✓		
--	---	--	--
- Is temporary hoarding provided around the treatment area to minimise the visual impact? 

	✓		
--	---	--	--

*Air Quality*

S7.23

**Good Site Practices**

- Is watering carried out regularly with complete coverage to reduce dust emissions from exposed site surfaces and unpaved roads, particularly during dry weather? 

		✓	
--	--	---	--
- Is watering frequently carried out for particularly dusty construction areas, temporary stockpiles and areas close to ASRs? 

		✓	
--	--	---	--
- Are the aggregate or dusty material storage piles covered with their side enclosed to reduce emissions? Or if this is not practicable, is watering applied to aggregate fines? 

		✓	
--	--	---	--
- Is open stockpiles avoided or covered and placed far enough from the ASRs? 

		✓	
--	--	---	--
- Is the dropping height of material restricted to minimise the fugitive dust from unloading/loading? 

		✓	
--	--	---	--
- Is tarpaulin used to cover all dusty vehicle loads transported to, from and within the site? 

		✓	
--	--	---	--
- Are vehicle wheel and body washing facilities available at the exit points of the site? 

		✓	
--	--	---	--
- Are wind shield and dust extraction units or similar dust mitigation measures provided at the loading points? If dust generation is likely during the process, particularly in dry seasons, is water sprinklers provided at the loading site? 

		✓	
--	--	---	--
- Do the vehicles comply with the recommended speed limit of 10 km/h on unpaved roads? 

		✓	
--	--	---	--
- Are dusty activities rescheduled during high-wind conditions? 

	✓		
--	---	--	--
- Are the routing of vehicles and positioning of construction plants at maximum possible distance from the ASRs? 

		✓	
--	--	---	--
- Is suitable buffer zone provided and work areas fenced off with hoarding (not less than 2.4m from ground level)? 

		✓	
--	--	---	--

S7.24

**Drilling & Blasting**

- Is watering carried out on the exposed area after blasting? 

	✓		
--	---	--	--
- Is vacuum extraction drilling method used? 

	✓		
--	---	--	--
- Is the blasting process carefully sequenced? 

	✓		
--	---	--	--

	<ul style="list-style-type: none"> <li>Is the firing of explosive carried out in the morning prior to opening of the Park?</li> </ul>		✓		
S7.25	Crushing Plant				
	<ul style="list-style-type: none"> <li>Is water sprayed on the crusher?</li> </ul>		✓		
	<ul style="list-style-type: none"> <li>Are fabric filters installed for the crushing plant?</li> </ul>		✓		
	<ul style="list-style-type: none"> <li>Is chute or dust curtain used for controlling dust when transferring materials from crusher to the conveyors?</li> </ul>		✓		
S7.26	Barging Point & Conveyor Belt System				
	<ul style="list-style-type: none"> <li>Are the conveyors placed within enclosed structures?</li> </ul>		✓		
	<ul style="list-style-type: none"> <li>Is profiled steel cladding provided at two sides of loading point?</li> </ul>		✓		
	<ul style="list-style-type: none"> <li>Are dust suppression sprays installed and operated at the feeding inlet and outlet?</li> </ul>		✓		
	<ul style="list-style-type: none"> <li>Is the barging point placed within an enclosed structure incorporating an enclosed chute for material transfer to the barge?</li> </ul>		✓		
	<ul style="list-style-type: none"> <li>Is a flexible curtain hanged on the enclosed chute to prevent dust emission when excavated materials/rocks transported into the barge?</li> </ul>		✓		

**Water Quality**

S8.3	Site Run-off and Drainage				
	<ul style="list-style-type: none"> <li>Are all sewer and drainage connections sealed to prevent debris, soil, sand etc. from entering public sewer before commencing any site formation work?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are temporary ditches provided to facilitate runoff discharge into appropriate watercourses, via appropriate sized silt retention pond?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are cut-off ditches provided for all major site clearance/excavation works where soils would be exposed to control runoff from the areas?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are channels, earth/concrete bunds and sand bags deployed to direct surface runoff?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are catchpits and perimeter channels constructed in advance of relevant site formation works?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are the boundaries of earthworks marked and surrounded by dykes or embankments for flood protection?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are sand/silt traps and sediment basins provided to remove sand/silt particles from runoff?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are silt removal facilities, channels and manholes maintained and deposited silt/grit removed regularly to ensure that these facilities are functioning properly at all times?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are exposed soil surfaces covered?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Is the water pumped out from foundation excavations discharged into silt removal facilities?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are exposed soil areas minimised to reduce potential for increased siltation and contamination of runoff?</li> </ul>			✓	
	<ul style="list-style-type: none"> <li>Are earthwork final surfaces well compacted and is subsequent permanent work or surface protection performed immediately?</li> </ul>			✓	

- Is the rainwater pumped out from trenches or excavation directed to silt removal facilities before discharge? 

			✓
--	--	--	---

 (P) P1130725
  - Are open stockpiles of construction materials or construction wastes of more than 50m<sup>3</sup> covered with tarpaulin during rainstorm? 

		✓	
--	--	---	--
- In case of an excavation in rainy seasons:
- Is temporary exposed slope/soil surfaces covered by tarpaulin as far as practicable? 

		✓	
--	--	---	--
  - Are intercepting channels provided to prevent storm runoff from washing across exposed soil surfaces? 

		✓	
--	--	---	--
  - Are surface protection measures and arrangements implemented to prepare for arrival of a rainstorm? 

		✓	
--	--	---	--

S8.4 Coral Sites

- Are enhanced (with the use of flocculants added) sand/silt removal facilities employed for treatment of runoff from the major excavation at the Summit? 

		✓	
--	--	---	--
- Is a silt curtain system used to enclose the construction phase discharge point at Tai Shue Wan? 

			✓
--	--	--	---

 (P) P1130732
- Are debris and refuse collected, handled and disposed of properly to avoid entering any nearby water bodies and public drainage system? 

		✓	
--	--	---	--
- Are stockpiles of cement and other construction materials kept covered when not being used? 

		✓	
--	--	---	--
- Are oils and fuels used and stored in designated areas which have pollution prevention facilities (Fuel tanks and storage areas provided with locks and sited on sealed areas, within bunds of a capacity equality to 110% of the storage capacity of the largest tank)? 

		✓	
--	--	---	--
- Are temporary sanitary facilities, such as portable chemical toilets, employed on-site where necessary to hand sewage from the workforce? Is a licensed contractor employed for disposal of waste matter and maintenance of these facilities? 

		✓	
--	--	---	--
- Is a reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law? 

		✓	
--	--	---	--
- Are aluminium cans recovered from the waste stream and collected separate labelled bins? 

		✓	
--	--	---	--
- Are office wastes reduced through the recycling of paper? 

		✓	
--	--	---	--
- Are training provided to workers on site cleanliness & waste management procedure? 

		✓	
--	--	---	--

Cultural Heritage

- S10.6 If there is any work planned within one metre of the grave, is a one metre buffer zone provided around the grave and is the grave demarcated by temporary fence? 

		✓	
--	--	---	--

Hazard to Life

- S11.3 Good Site Practices:
- Is the area around the magazine free of vegetation? 

	✓		
--	---	--	--
  - Is the control of (small) fires planned and provided through the following? 

--	--	--	--

- Weekly checking of fire fighting equipment and the on-site fire water tank level. 

	✓		
--	---	--	--
- Daily checking of all critical safety equipment on vehicle, including the fire extinguishers. 

	✓		
--	---	--	--
- Maintaining back-up means of fighting fire on the explosive vehicles. 

	✓		
--	---	--	--
- Providing safety training for drivers and other personnel present during explosive delivery with regard to operating fire hydrants and fighting of explosive fires. 

	✓		
--	---	--	--
- Is the magazine secured against unauthorised entry and theft of explosive through the following?
  - Maintaining a list of persons authorised to enter the magazine and ensuring the list is available to the magazine security guard. 

	✓		
--	---	--	--
  - Activating an alarm system that limits times at which explosive can be removed from the magazine and connecting the system to central security station. 

	✓		
--	---	--	--
  - Incorporating "Duress code" function in the alarm system. 

	✓		
--	---	--	--
  - Maintaining alarm system in good condition. 

	✓		
--	---	--	--
- Is the magazine security guard located separately from the magazine complex? 

	✓		
--	---	--	--
- Is the communication maintained in emergency with the following measures?
  - Providing non-hazardous electronic equipment for persons working within 60 m of detonators. 

	✓		
--	---	--	--
  - Ensuring availability of phone numbers for all key personnel. 

	✓		
--	---	--	--
- If there is a typhoon signal no. 3 or above, or black rainstorm signal, are all operations at magazine and transport ceased? 

	✓		
--	---	--	--
- Is the risk of detonators explosion on vehicle reduced during transit through the following?
  - Ensuring that magazine within vehicle is lined. 

	✓		
--	---	--	--
  - Limiting off-site transport to 5 to 6 a.m. each day. 

	✓		
--	---	--	--
  - Escorting vehicles with separate security vehicle when using the public road. 

	✓		
--	---	--	--
  - Ensuring that UN 1.4B packaging of detonators remains intact until handed over at blasting site. 

	✓		
--	---	--	--
- Is the fuel isolation switch available on vehicle to prevent fire spreading in case a fire breaks out? 

	✓		
--	---	--	--
- Is an experienced driver with accident-free record employed for explosive vehicle and security escort? 

	✓		
--	---	--	--
- Are the drivers checked for health before employing? 

	✓		
--	---	--	--
- Are the vehicles regularly checked to maintain in good condition to reduce chance of accident due to breaking down? 

	✓		
--	---	--	--
- Is the truck fuel fire escalating to cause explosion avoided through the following means?
  - Ensuring that the Contractor is aware of the potential hazards to site. 

	✓		
--	---	--	--
  - Maintaining appropriate fire fighting equipment. 

	✓		
--	---	--	--

- Requiring the Contractor to plan and make emergency arrangements. 

	✓		
--	---	--	--
  
- Is spare/redundant fire fighting equipment provided? 

	✓		
--	---	--	--
  
- Can communications be maintained between two vehicles (drivers and security) during the trip to prevent collision of two explosive vehicles in case of an accident? 

	✓		
--	---	--	--
  
- Are the processes of checking of condition of drivers to suspend any driver of concern carried out? 

	✓		
--	---	--	--
  
- Project specific measures:
- Is the speed of vehicle limited along the Ocean Park portion of Nam Long Shan Road within 100 m of the explosives magazine to 25 km/hr? 

	✓		
--	---	--	--
  
- Is other contractors' use of the Ocean Park Internal service road restricted during delivery of explosives, i.e. 6 to 7 a.m? 

	✓		
--	---	--	--
  
- Is the Ocean Park guard required to call to the magazine guard on an hourly basis when explosives are stored in magazines? 

	✓		
--	---	--	--
  
- Is the evacuation of part or all of Ocean Park Headland Area arranged in case of the explosive magazine being engulfed in fire? 

	✓		
--	---	--	--
  
- Is the risk to the public from accidental initiation during charging and blasting limited by the following means?
- Closing the Ocean Park from commencement of charging holes until completion of blasting each day. 

	✓		
--	---	--	--
  
- Arranging for relevant authorities to post notices to mariners – warning them of blasting operations and advising them to stay away from a strip 100m wide immediately to the east of Headland from commencement of charge holes until completion of blasting each day (i.e. 9 a.m). 

	✓		
--	---	--	--
  
- Not operating amusement rides in the event of accidental explosion until confirmed free of critical damage. 

	✓		
--	---	--	--
  
- If unexploded explosives are found in blasthole(s), is the opening of Ocean Park delayed or is part of the Ocean Park delayed when there are unspent explosives? 

	✓		
--	---	--	--
  
- Is the opportunity for arson/deliberate initiation of explosive reduced with the following means?
- Paying attention to the security alert status from the Government. 

	✓		
--	---	--	--
  
- Developing a security plan to address high alert level. 

	✓		
--	---	--	--
  
- Is an emergency plan developed to address uncontrolled fire in magazine area? 

	✓		
--	---	--	--
  
- Is the transfer of explosives between 5 to 6 a.m agreed by Mines Division? 

	✓		
--	---	--	--
  
- Is the road surface along the explosive transportation route maintained? 

	✓		
--	---	--	--
  
- Are the contractor's driver and security escort tested in respect of safety plan? Is the route driven before the driver undertakes the first delivery of explosives? 

	✓		
--	---	--	--
  
- Is adequate space provided for the explosive vehicle to manoeuvre without reversing close to the magazine to limit the likelihood of vehicle accident? 

	✓		
--	---	--	--
  
- Is lighting for explosive vehicles provided on temporary 

	✓		
--	---	--	--

road(s)?

--	--	--	--

S11.4

• Is ammonium nitrate emulsion (ANE) delivered outside of Park opening times?

--	--	--	--

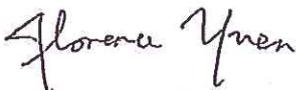
Observations for this month

- ① Stagnant water was accumulated on site after heavy rain. The Contractor was reminded to remove them as soon as possible.
- ② A few drums with hydraulic vegetable oil were placed on background. The Contractor indicate that the oil will be used for installation works and any oil drums not used will be placed in permanent storage area.
- ③ The Contractor was recommended to dispose surplus C&D material to public fill as soon as possible.
- ④ The Contractor was recommended to maintain the silt curtain regularly and properly.

IEC Representative

Environmental Manager

Contractor's Representative  
CS03





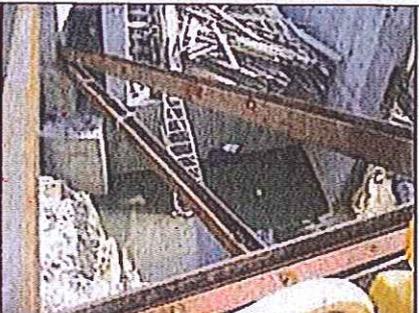
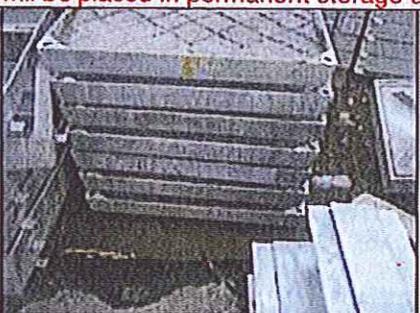


( Florence Yuen )

( Lindsay Pickles )

( Jimmy Tam )

Ocean Park Master Redevelopment Project  
 Contract P007  
 Independent Environmental Checker  
 MONTHLY SITE INSPECTION PHOTOS

Contract CS03 Trill Mountain and Polar Adventure	
Follow up observations In July 2011	
Observation in last site inspection	Observation in this site inspection
	
	
<p>P1130459 &amp; P1130452: Oil drums were placed on bare ground. The Contractor was reminded either to provide drip trays to the oil drums or store them in the chemical storage area.</p>	<p>P1130727: A few drums with hydraulic vegetable oil were placed on bare ground. The Contractor indicated that the oil will be used for installation works and any oil drums not used will be placed in permanent storage area.</p>
	
<p>P1130446: Stagnant water was accumulated on site after heavy rain last week. The Contractor was reminded to remove them as soon as possible.</p>	<p>P1130725: Stagnant water was accumulated on site after heavy rain. The Contractor was reminded to remove them as soon as possible.</p>

Ocean Park Master Redevelopment Project  
Contract P007  
Independent Environmental Checker  
MONTHLY SITE INSPECTION PHOTOS

Observations in August 2011	
	
<p>P1130730: The Contractor was recommended to dispose surplus C&amp;D material to public fill as soon as possible.</p>	<p>P1130732: The Contractor was recommended to maintain the silt curtain regularly and properly.</p>

**Part 2 CS-03 EM&A REPORT (August 2011)**



**Contract No. CS03**

**Ocean Park Redevelopment Project  
- Thrill Mountain & Polar Adventure**

**Monthly EM&A Report**

August 2011

Prepared By

Alex Enagnon Gbaguidi

Certified By

(Hui Sui Wah)

(Senior Construction Manager)

## TABLE OF CONTENTS

	Page
<b>EXECUTIVE SUMMARY</b> .....	<b>1</b>
<b>1. INTRODUCTION</b> .....	<b>3</b>
Background .....	3
Project Organizations .....	3
Construction Programme.....	4
Summary of EM&A Requirements.....	4
<b>2. ENVIRONMENTAL AUDIT</b> .....	<b>5</b>
Environmental Site Audits .....	5
Status of Environmental Licensing and Permitting.....	6
Status of Waste Management .....	6
Implementation Status of Environmental Mitigation Measures.....	7
Summary of Exceedances.....	8
Implementation Status of Event Action Plans.....	8
Summary of Complaints and Prosecutions .....	8
<b>3. FUTURE KEY ISSUES</b> .....	<b>8</b>
Key Issues for the Coming Month.....	8
<b>4. CONCLUSIONS AND RECOMMENDATIONS</b> .....	<b>8</b>
Conclusions .....	9
Recommendations .....	9

## **LIST OF FIGURE**

Figure 1.1 Site Layout Plan

## **LIST OF APPENDICES**

A Site Audit Summary

## **LIST OF TABLES**

Table 1.1 Key Project Contacts

Table 2.1 Observations and Recommendations of Site Audits

Table 2.2 Summary of Environmental Licensing and Permit Status

Table 2.3 Actual Quantity of Waste Generated in August 2011

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## EXECUTIVE SUMMARY

### Introduction

This is the 22<sup>nd</sup> monthly Environmental Monitoring and Audit (EM&A) Report prepared by Kaden – ATAL JV for the Contract No. CS03 “Ocean Park Redevelopment Project – Thrill Mountain & Polar Adventure” (hereinafter called “the Project”). The Project was commenced on 2<sup>nd</sup> November 2009. This document reports the findings of the environmental auditing works conducted in August 2011.

The major site activities undertaken in the reporting month included:

- Construction of Tuxedos Restaurant at South Pole;
- Finishing works of Bobsled Station superstructure and installation of rides;
- Erection of structure steel works for Thrill Mountain;
- Finishing works at Thrill Mountain
- Carry out wall finishing works for PA Building;
- Theme works at PA Building;
- Finishing works at Floorless Coaster Station;
- Wet trade work at Floorless Coaster;
- Apply waterproofing at roof of Floorless Coaster;
- Installation of theme works and
- Disposal Existing Stockpile.

### Environmental Monitoring and Audit Works

Environmental monitoring and audit works for the Project was performed as stipulated in the updated EM&A Manual. Site audits were conducted once per week. Environmental site audits were conducted on 5<sup>th</sup>, 12<sup>th</sup>, 19<sup>th</sup> & 26<sup>th</sup> August 2011 and the environmental ICE monthly site inspection was conducted on 25<sup>th</sup> August 2011 and No non-compliance was observed during the site audits.

The implementation of the environmental mitigation measures was checked and the environmental management plan was submitted.

No notification of exceedance was received from the Assistance Project Environmental Team Leader (ETL) in the reporting month.

### **Environmental Licenses and Permits**

Licenses/Permits granted to the Project include the Environmental Permit (EP) for the Redevelopment Project, Construction Noise Permit (CNP), Billing Account for Disposal of Construction Waste and Water Discharge License

Registration of Waste Producer (Chemical Waste), and notification pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation was acknowledged by EPD.

### **Complaints and Prosecutions**

No environmental complaint and prosecution was received in the reporting month.

### **Future Key Issues**

Key issues to be considered in the coming month include:

- Wet trade work at Floorless Coaster;
- Installation of Ride Track at Bobsled Station;
- Installation of track at Bumper Blaster;
- Internal Finishing Works at PA Building;
- Erection of structural steel for Floorless Coaster workshop;
- Erection of structural steel for Aviator;
- Erection of structural steel for one side game booth;
- Erection of structural steel for four side game booth;
- Erection of structural steel for dinner hall and food kiosk;
- Internal Finishing Works for dinner hall and food kiosk;
- Construction of Tuxedos Restaurant at South Pole;
- Installation of theme works.

## 1. INTRODUCTION

### Background

- 1.1 Kaden-ATAL JV (the Contractor) was commissioned by the Employer to undertake the construction of the Contract No. CS03 “Ocean Park Redevelopment Project – Thrill Mountain & Polar Adventure” (the Project) and the project was commenced on 2<sup>nd</sup> November 2009. The site layout plan is illustrated in Figure 1.1.
- 1.2 These report summaries the environmental monitoring and audit works for the Project in the month of August 2011.
- 1.3 The scope of works for the Project includes:
- (a) Construction of summit reservoir and associated pump room.
  - (b) Construction of vehicular bridge.
  - (c) Construction of the Polar Adventure Building.
  - (d) Construction of back of house facilities in the Polar Adventure Building.
  - (e) Construction of other one to three storey buildings in Polar Adventure.
  - (f) Construction of foundation and installation of Bobsled Ride.
  - (g) Installation of Life Support Systems.
  - (h) Construction of one to three storey buildings in Thrill Mountain.
  - (i) Construction of foundation and installation of the Floorless Coaster.
  - (j) Installation of the Ultramax, Aviator, Musik Express and Bumper Car.
  - (k) New roadwork, paving, footpaths and infrastructure support.
  - (l) Installation of building services.
  - (m) Soft and hard landscape works.
  - (n) Construction of underground utilities and services.
  - (o) Construction of earth retaining structures.
  - (p) Construction of all interior fitting out works.
  - (q) Supply and installation of all elevator(s) and escalator(s).
  - (r) Coral survey and maintenance of existing suit curtain.

### Project Organizations

- 1.4 Different parties with different levels of involvement in the project organization include:
- The Engineer and Project Environmental Team Leader (ETL) – AECOM Consultant Ltd.
  - Contractor – Kaden-ATAL JV.
  - Independent Environmental Checker (IEC) – Mott MacDonald HK Ltd.
- 1.5 The responsibilities of respective parties are provided in Section the Contractor’s EM&A Manual of the Project.
- 1.6 The key contacts of the Project are shown in **Table 1.1**.
-

**Table 1.1 Key Project Contacts**

Party	Name	Role	Phone No.	Fax No.
Project ET	Mr. Tommy Lau	RSS Representative (Safety & Environmental)	2552 1546	2552 1406
Contractor	Mr. Keith Kwan	Acting Project Manager	3582 6099	3582 4877
	Mr. Eric Wong	Construction Manager	3582 6005	
Contractor's ET	Mr. Alex Enagnon Gbaguidi	Contractor's Assistance Environmental Team Leader	3582 4880	3582 4877
IEC	Miss Florence Yuen	Independent Environmental Checker (IEC) Representative	2828 5757	28271823

## Construction Programme

1.7 The site activities undertaken in the reporting month were:

- Construction of Tuxedos Restaurant at South Pole;
- Finishing works of Bobsled Station superstructure and installation of rides;
- Erection of structure steel works for Thrill Mountain;
- Finishing works at Thrill Mountain
- Carry out wall finishing works for PA Building;
- Theme works at PA Building;
- Finishing works at Floorless Coaster Station;
- Wet trade work at Floorless Coaster;
- Apply waterproofing at roof of Floorless Coaster;
- Installation of theme works and
- Disposal Existing Stockpile.

## Summary of EM&A Requirements

1.8 The EM&A programme requires construction phase environmental site audit. The duties and responsibilities comprise the following:

- monitor various environmental parameters, if necessary, as specified in the Contractor's EM&A Manual;
- analyze the environmental monitoring and audit data;
- review the EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify and adverse environmental impacts arising;
- carry out site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems;

- audit and prepare EM&A reports on the site environmental conditions;
- report the environmental audit results to the Contractor;
- recommend appropriate mitigation measures to the Contractor in case of exceedance of Action and Limit Levels in accordance with the Event and Action Plans; and
- adhere to the procedures for carrying out complaint investigation in accordance with the Contractor's EM&A Manual.

1.9 This report presents the environmental monitoring and audit works for the Project in August 2011.

## 2. ENVIRONMENTAL AUDIT

### Environmental Site Audits

- 2.1 Environmental site audits were carried out on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Project site.
- 2.2 Site audits for the Project in the reporting month were conducted on Environmental site audits were conducted on 5<sup>th</sup>, 12<sup>th</sup>, 19<sup>th</sup> & 26<sup>th</sup> August 2011 and the environmental ICE monthly site inspection was conducted on 25<sup>th</sup> August 2011 and No non-compliance was observed during the site audits. The summaries of site audits are attached in Appendix A.
- 2.3 During site inspections in the reporting month, no non-conformance was identified. The observations and recommendations are summarized in **Table 2.1**.

**Table 2.1 Observations and Recommendations of Site Audits**

Parameters	Date	Observations / Recommendations	Remediation/ Follow up
Waste/ Chemical Management	25/08/11	A few drums with hydraulic vegetable oil were placed on bareground.	These oil were used for installation work. Any oil drum not used will be placed in permanent storage area.
	25/08/11	Stagnant water was accumulated on site after heavy rain.	Remove stagnant water immediately.
Dust Control	25/08/11	An idled stockpile was not covered. The contractor was recommended to dispose surplus C&D material to public fill as soon as possible.	Exceeded stockpiles were disposed to public fill.

Parameters	Date	Observations / Recommendations	Remediation/ Follow up
	12/08/11	Part of the haul road was dry.	Provide water spray regularly to suppress dust.
Water Pollution	25/8/11	The contractor was recommended to maintain the silt curtain regularly and properly.	Assign Specialist contractor to check and maintenance the silt curtain regularly.
Air Pollution	5/8/11	N/A	

### Status of Environmental Licensing and Permitting

2.4 All valid permits/licenses obtained for the Project are summarized in Table 2.2.

**Table 2.2 Summary of Environmental Licensing and Permit Status**

Permit No.	Valid Period		Details	Status
	From	To		
<b>Environmental Permit</b>				
EP-249/2006/A	23/10/2006	N/A	Expansion of the existing Ocean Park and reconstruction / modification of its existing facilities.	Valid
<b>Registration of Chemical Waste Producer</b>				
WPN5213-176-K2880-02	25/11/2009	N/A	Waste Disposal (Chemical Waste) (General) Regulation - Registration of Waste Producer	Valid
<b>Construction Noise Permit</b>				
GW-RS0516-11	09/06/2011	30/11/2011	Construction Noise Permit for Top of Nam Long Shan Rd., Ocean Park, 180 Wong Chuk Hang, Hong Kong	Valid
<b>Water Discharge License</b>				
WT00005926-2010	05/11/2009	28/02/2015	Discharge of industrial trade effluent arising from the Sedimentation tank at the construction site (CS03 Ocean Park Redevelopment Project) to communal storm water drain.	Valid
<b>Others</b>				
311433	N/A	N/A	Notification Pursuant to Section 3(1) of the Air Pollution Control (Construction Dust) Regulation	Valid
7009695	N/A	N/A	Construction Waste Disposal Billing Account with EPD	Valid

### Status of Waste Management

2.5 The amount of waste generated by the construction activities of the Project in the reporting month is attached in Table 2.3.

**Table 2.3 Actual Quantity of Waste Generated in August 2011**

Waste Type	Examples	Actual quantity disposed (Tonnes / Liter)	Disposal Locations
C&D Waste	Construction waste (Plastic, wood and bamboo)	266.7 (T)	SENT Landfill
	Mixed rock & soil	261.8 (T)	CW barging point
Chemical waste	Used oil, spent solvent	0 L	Collected by licensed collector

### Implementation Status of Environmental Mitigation Measures

- 2.6 During site inspections in the month, the following observations and recommendations were made.

#### Water Quality Mitigation Measures

- The wastewater was recycled for wheel washing and dust control and Septic Tank should be maintained well functioning.

#### Air Quality Mitigation Measures

- The Contractor to ensure cement materials was well covered.
- The Contractor to ensure water spray was carrying out during breaking of rocks.
- The Contractor was reminded to cover the existing stockpile general fill material when they were not in use.

#### Noise

- No violation was observed nor recorded.

#### Ecology

- No violation was observed nor recorded.

#### Waste / Chemical Management

- Stagnant water was accumulated in drip tray. Contractor to ensure all contaminated water was well collected and stored in chemical waste storage area without spillage.

- Oil drums were observed without drip tray and placed on the ground. Ensure no spillage of the chemical oil and provide drip tray accordingly.
- Collection of waste oil by registered waste collector.

#### **Others**

- No other violation was observed nor recorded.

#### **Summary of Exceedances**

- 2.7 No Action/Limit Level exceedance was reported in the reporting month.

#### **Implementation Status of Event Action Plans**

- 2.8 No complaint, summons or prosecution related to environmental issues was received or made against the Project in the reporting month.

#### **Summary of Complaints and Prosecutions**

- 2.9 No environmental complaint and prosecution related to the Project works was received during the reporting month.

### **3. FUTURE KEY ISSUES**

#### **Key Issues for the Coming Month**

- 3.1 Key issues to be considered in the coming month include:
- Wet trade work at Floorless Coaster;
  - Installation of Ride Track at Bobsled Station;
  - Installation of track at Bumper Blaster;
  - Internal Finishing Works at PA Building;
  - Erection of structural steel for Floorless Coaster workshop;
  - Erection of structural steel for Aviator;
  - Erection of structural steel for one side game booth;
  - Erection of structural steel for four side game booth;
  - Erection of structural steel for dinner hall and food kiosk;
  - Internal Finishing Works for dinner hall and food kiosk;
  - Construction of Tuxedos Restaurant at South Pole;
  - Installation of theme works.

---

#### 4. CONSTRUCTION OF DRAINAGE, SEWERAGE AND WATER MAIN SYSTEM. CONCLUSIONS AND RECOMMENDATIONS

##### Conclusions

- 4.1 Four environmental site audits were performed in August 2011. No non-compliance was observed during the site audits.
- 4.2 No exceedance of environmental monitoring was reported in the reporting month.
- 4.3 No environmental complaint and prosecution related to the project was received in the reporting month.

##### Recommendations

- 4.4 According to the environmental audits performed in the reporting month, the following recommendations are suggested:

##### *Water Quality Impact*

- Should ensure that the sedimentation tank is well function before discharging waste water off site.

##### *Dust Impact*

- To carry out routine water spray to all haul roads and during rock breaking activity.
- To cover the existing stockpile general fill material when they were not in use.
- To ensure auto water spray head is on when the floor is dry and dusty.

##### *Waste / Chemical Waste Impact*

- To carry out routine inspection for chemical waste storage area after rainy day.
- To ensure spent oil keep in dip tray during drilling rig maintenance.
- To ensure all domestic waste was fully cover in rubbish bin and cleaning up frequently.
- To ensure general refuse were store in the enclosed container or compaction units and separate from C& D materials.

##### *Air Pollution Impact*

- To ensure all plants and equipments are well maintained in good condition and replace air filter frequently.

## Site Layout Plan

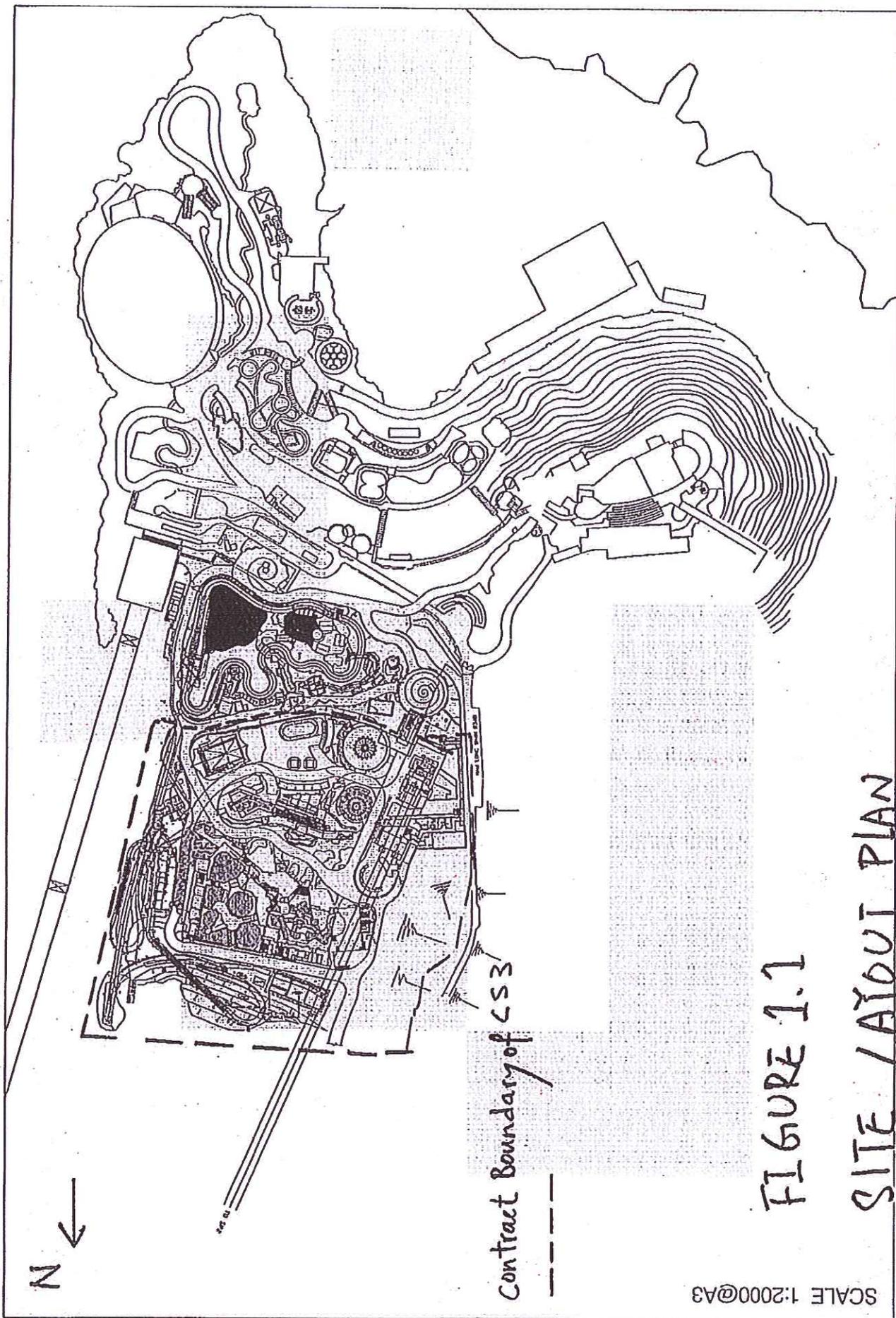


FIGURE 1.1

SITE LAYOUT PLAN

SCALE 1:2000@A3

**APPENDIX A**  
**Site Audit Summary**  
**(refer to Appendix A of EM & A Report)**

**Part 3      Ocean Park Symbio Show  
6th Monthly Monitoring Report**

Ocean Park Corporation, Hong Kong

Ocean Park Symbio Show:  
*6<sup>th</sup> Air Quality and Noise Monitoring  
Report*

August 2011

**Environmental Resources Management**

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Ocean Park Corporation, Hong Kong

Ocean Park Symbio Show:  
*6<sup>th</sup> Air Quality and Noise Monitoring  
Report*

August 2011

Reference 0128330

For and on behalf of  
ERM-Hong Kong, Limited

Approved by: Frank Wan

Signed: 

Position: Partner

Date: 11 August 2011

## CONTENTS

1	INTRODUCTION	1
1.1	PURPOSE OF THE REPORT	1
1.2	STRUCTURE OF THE REPORT	1
2	AIR QUALITY MONITORING	2
2.1	INTRODUCTION	2
2.2	SAMPLING METHODOLOGY	2
2.3	MONITORING RESULTS	3
3	NOISE MONITORING	5
3.1	INTRODUCTION	5
3.2	NOISE MONITORING REQUIREMENTS	5
3.3	RESULTS OF NOISE MONITORING	8
3.4	SUMMARY OF NOISE EXCEEDANCES	8
4	OVERALL CONCLUSIONS	10

## ANNEXES

Annex A1	Calibration Record
Annex A2	Laboratory Report
Annex A3	Detailed Summary and Graphical Presentation of the Cumulative Results Since Commencement of Open-air Night Show
Annex A4	Recorded RSP Concentrations at EPD's AQMSs in Tung Chung, Shatin, Tai Po, Yuen Long, and Tap Mun on 22 July 2011
Annex A5	Recorded Weather Data at HKO's Weather Station in Wong Chuk Hang on 22 July 2011
Annex B1	Calibration Certificates of the Noise Measurement Equipment
Annex B2	Results of Noise Monitoring
Annex B3	Graphical Presentation of Noise Monitoring Results

## 1 INTRODUCTION

ERM-Hong Kong, Limited (ERM) has been appointed by Ocean Park Corporation (OPC) to undertake air quality and noise monitoring for the first operational year of the Open-air Night Show under the “*Repositioning and Long Term Operation Plan of Ocean Park*” (the Project).

### 1.1 PURPOSE OF THE REPORT

The Open-air Night Show commenced on 27 January 2011. This is the 6<sup>th</sup> air quality and noise monitoring report which summarises the impact monitoring results during the reporting period from 27 June to 26 July 2011.

### 1.2 STRUCTURE OF THE REPORT

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

*Section 2* describes the air quality sampling methodology, presents the monitoring results and discusses the results;

*Section 3* describes the noise monitoring methodology, presents the monitoring results and discusses the results;

*Section 4* presents an overall conclusion of the air quality and noise monitoring.

## 2.1 INTRODUCTION

In accordance with Clause 2.31 of the Environmental Permit (EP), an updated air quality monitoring programme shall be developed as part of the updated EM&A Manual for the measurement of air quality impact (in terms of respirable suspended particulates, RSP) during the first operational year of the Open-air Night Show and for submission to the Director of Environmental Protection (DEP) in January 2011. The air quality monitoring has been carried out based on the requirements given in the updated air quality monitoring programme.

## 2.2 SAMPLING METHODOLOGY

### 2.2.1 Sampling Parameters and Frequency

In accordance with the updated air quality monitoring programme, 24-hr average RSP levels should be monitored on a weekly basis in the first month of the Open-air Night Show. If the monitored results in the first month complied with Action/Limit (A/L) Level, the monitoring frequency should be reduced to a monthly interval for the rest of eleven months in the first operational year. Monitoring of the 24-hr average RSP has commenced at AM1 in the 1<sup>st</sup> reporting month and at AM2 and AM3 in the 3<sup>rd</sup> reporting month. Monthly monitoring of 24-hr average RSP was taken at AM1, AM2 and AM3 on 22 July 2011.

### 2.2.2 Sampling Locations

Air quality monitoring was conducted at three designated air quality monitoring stations (AQMS) as presented in *Table 2.1* and illustrated in *Figure 2.1*.

*Table 2.1 Air Quality Monitoring Station*

AQMS ID	Location	Sampling Height (m above ground)
AM1	Rooftop of Administrative Building (Former Staff Quarters) in Ocean Park	10
AM2	Landscape Storage Area in Ocean Park	3
AM3	Rooftop of Main Medical Block of Graham Hospital	20

### 2.2.3 Sampling and Laboratory Analysis Methodology

One 24-hr average RSP sample was collected on each scheduled day by a High Volume Sampler (HVS) following the USEPA method, EPA IO-2.1. Calibration of the equipment has followed the requirements set out in EPA IO-2.1 with the calibration record given in *Annex A1*. A summary of the sampling methodology and equipment is presented in *Table 2.2*.

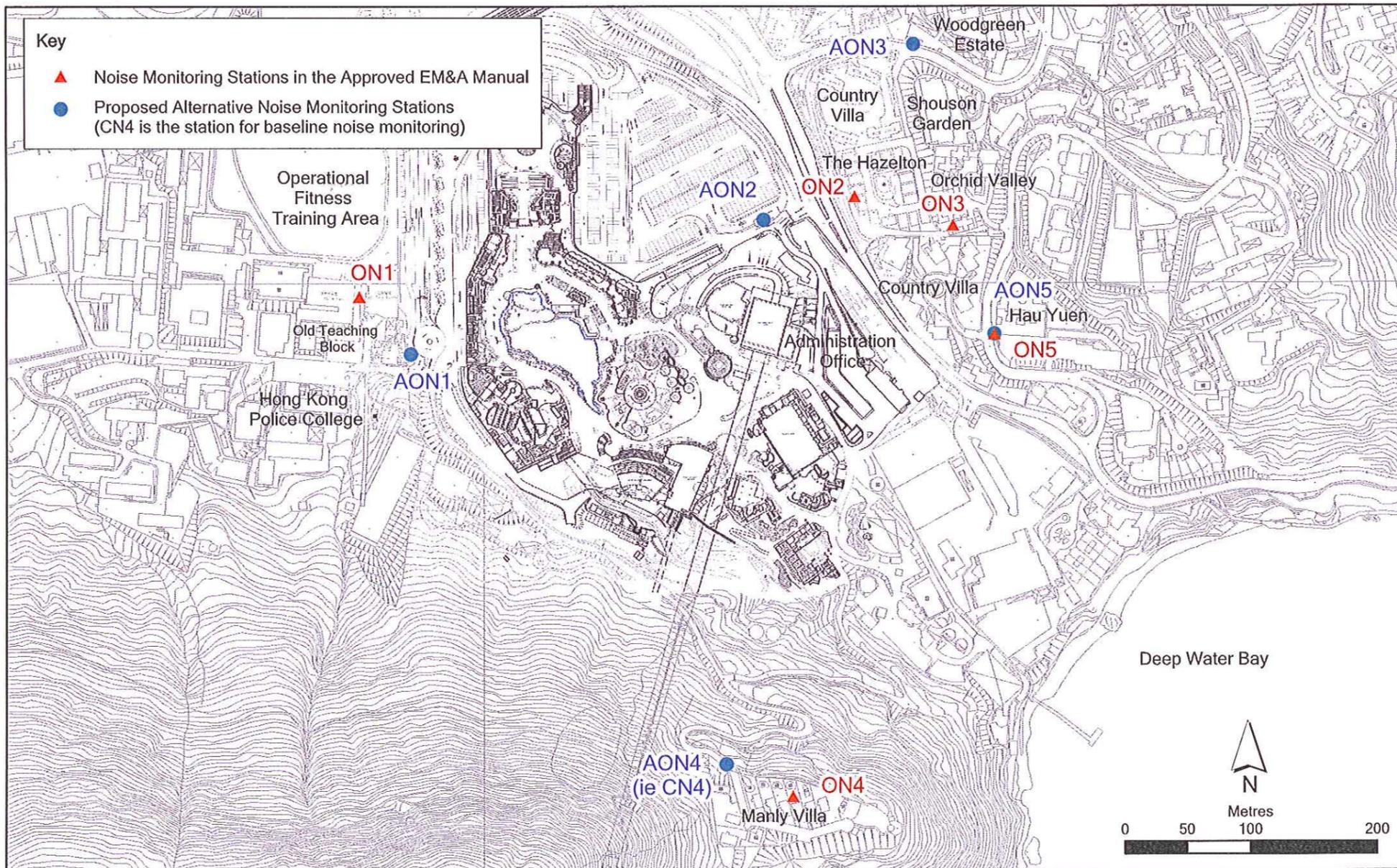


Figure 3.1

Proposed Noise Monitoring Stations in the Approved EM&A Manual and Proposed Alternative Noise Monitoring Stations

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Environmental Resources Management



**Table 2.2** *Summary of Sampling and Laboratory Analysis Method*

Sampling Parameter	Method	Equipment
24-hr average RSP	EPA IO-2.1	High volume sampler

**2.2.4** *Sampling Period*

The sampling periods at AM1, AM2 and AM3 are summarized in *Table 2.3*.

**Table 2.3** *Sampling Period*

Sampling Parameter	Sampling Period	AQMS
24-hr average RSP	17:00 (22 July 2011) – 17:00 (23 July 2011)	AM1, AM2, AM3

**2.2.5** *Compliance Assessment*

The measured 24-hr average RSP concentrations have been compared with the Action/Limit Level (A/L Level) which is the 24-hr average AQO for RSP (180  $\mu\text{g}\cdot\text{m}^{-3}$ ). Should exceedance of A/L Level occur, actions summarized in the Event and Action Plan (*Table 7.5* of updated EM&A Manual) should be followed.

**2.3** *MONITORING RESULTS*

The 24-hour average RSP concentrations monitored at AM1, AM2 and AM3 are summarized in *Table 2.4*. The detailed laboratory report is presented in *Annex A2*.

**Table 2.4** *24-hr Average RSP Monitoring Results*

Monitoring Location	Monitoring Date	24-hr RSP Concentration ( $\mu\text{g}\cdot\text{m}^{-3}$ )	Action/Limit Level ( $\mu\text{g}\cdot\text{m}^{-3}$ )
AM1 (Rooftop of Administrative Building (Old Staff Quarters) in Ocean Park)	22 July 2011	26	180
AM2 (Landscape Storage Area in Ocean Park)	22 July 2011	26	180
AM3 (Rooftop of Main Medical Block of Graham Hospital)	22 July 2011	26	180

All measured 24-hour average RSP concentrations have been well below the A/L Level (ie, 180  $\mu\text{g}\cdot\text{m}^{-3}$ ). Detailed summary of the air quality monitoring data and graphical presentation of the cumulative results since the commencement of Open-air Night Show are given in *Annex A3*.

The 24-hour average RSP concentrations during the Open-air Night Show time measured at five EPD air quality monitoring stations (AQMSs) at Tung Chung, Shatin, Tai Po, Yuen Long and Tap Mun were also provided as a reference (See *Annex A4*).

The 24-hour average background RSP concentrations measured at the 5 EPD stations were between 13.2 and 39.5  $\mu\text{g m}^{-3}$  during the reporting period. The monitored 24-hr average RSP concentrations at AM1, AM2 and AM3 have been compared with those measured at the EPD's AQMSs during the same monitoring periods. The measured results are comparable with the background concentrations and well below the A/L Level.

Wind data (including wind directions and speeds), ambient temperature and relative humidity measured at Wong Chuk Hang weather station operated by the Hong Kong Observatory (HKO) were also provided in *Annex A5* for reference.

### 3 NOISE MONITORING

#### 3.1 INTRODUCTION

Noise monitoring has been carried out following the requirements given in the updated EM&A Manual. The requirements and results are detailed in the following sections.

#### 3.2 NOISE MONITORING REQUIREMENTS

It has been recommended in the EIA Report for "*Repositioning and Long Term Operation Plan of Ocean Park*" and stated in the EM&A Manual that fixed plant noise source monitoring should be conducted during the first operational year of the Open-air Night Show at the Aqua City.

The monitoring of fixed plant noise source impact is to be conducted:

- During the lagoon night show (hereinafter referred to as "lagoon night show noise monitoring")
- Not during the lagoon night show (hereinafter referred to as "daily operational noise monitoring")

Lagoon night show noise monitoring was carried out at all designated monitoring stations during the performance of lagoon night shows at a logging interval of 30 minutes. The noise monitoring was conducted twice a week, i.e. once on a normal weekday and once on a general holiday or Sunday.

The need for noise monitoring during the lagoon night show was reviewed based on the monitoring results, any requirements to adjust the loudspeaker system, and any change to the show schedule or rundown. With the same loudspeaker system and show rundown, if the noise levels of the month comply with the fixed plant noise criteria as stipulated in *Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM)*, or are consistent with the baseline noise levels, the ETL may consider not including the noise monitoring in the subsequent monitoring programme. Agreement from the IEC and approval from EPD must be sought prior to suspension of noise monitoring. Impact monitoring can be resumed if there is any change to the power, orientation, and volume of the loudspeaker system, or to the show rundown, or an increase of show frequency.

For daily operational noise monitoring, 30-minute average noise measurement at each designated station during the operational hours of Ocean Park but not during the lagoon night show should be conducted. The monitoring frequency should be the same as that for the noise monitoring during the

lagoon night show. Agreement from the IEC and approval from EPD must be obtained prior to suspension of noise monitoring.

The following sections describe the detailed methodology of the fixed plant noise monitoring.

### 3.2.1 *Monitoring Locations*

Noise monitoring was conducted at five designated noise monitoring locations in accordance with the approved EM&A Manual. Alternative noise monitoring has been proposed because of accessibility problem, as presented in *Table 3.1*, and shown in *Figure 3.1*.

**Table 3.1** *Alternative Noise Monitoring Stations during the Operational Phase*

Alternative Noise Monitoring Stations	Description	Location	With or without Façade Correction
AON1	Open Area adjacent to Police Training School	1.2m above street level	without facade correction
AON2	Old canteen building, Ocean Park	1.2m above roof level	with facade correction
AON3	Woodgreen Estate	1.2m above street level outside boundary wall	with facade correction
AON4	Manly Villa	1.2m above street level near the entrance	with facade correction
AON5	Hau Yuen	1.2m above street level outside boundary wall	with façade correction

### 3.2.2 *Monitoring Parameters*

#### *Lagoon Night Show Noise Monitoring*

Six consecutive measurements of  $L_{Aeq, 5 \text{ min}}$  reading were carried out to calculate the  $L_{Aeq, 30 \text{ min}}$  noise level during the lagoon night show.

#### *Daily Operational Noise Monitoring*

Six consecutive measurements of  $L_{Aeq, 5 \text{ min}}$  reading were carried out to calculate the  $L_{Aeq, 30 \text{ min}}$  noise level before the lagoon night show, ie during operation of the Ocean Park.

#### *Background Noise Level*

Three consecutive measurements of  $L_{Aeq, 5 \text{ min}}$  reading were carried out to calculate the  $L_{Aeq, 15 \text{ min}}$  noise level after the lagoon night show, ie without operation of the Ocean Park.

Any significant influencing factors on the measured noise levels were taken into account in accordance with standard acoustical principles and practices. The corrected noise level due to the lagoon night show and the operation of Ocean Park was computed based on the background noise level and measured noise level.

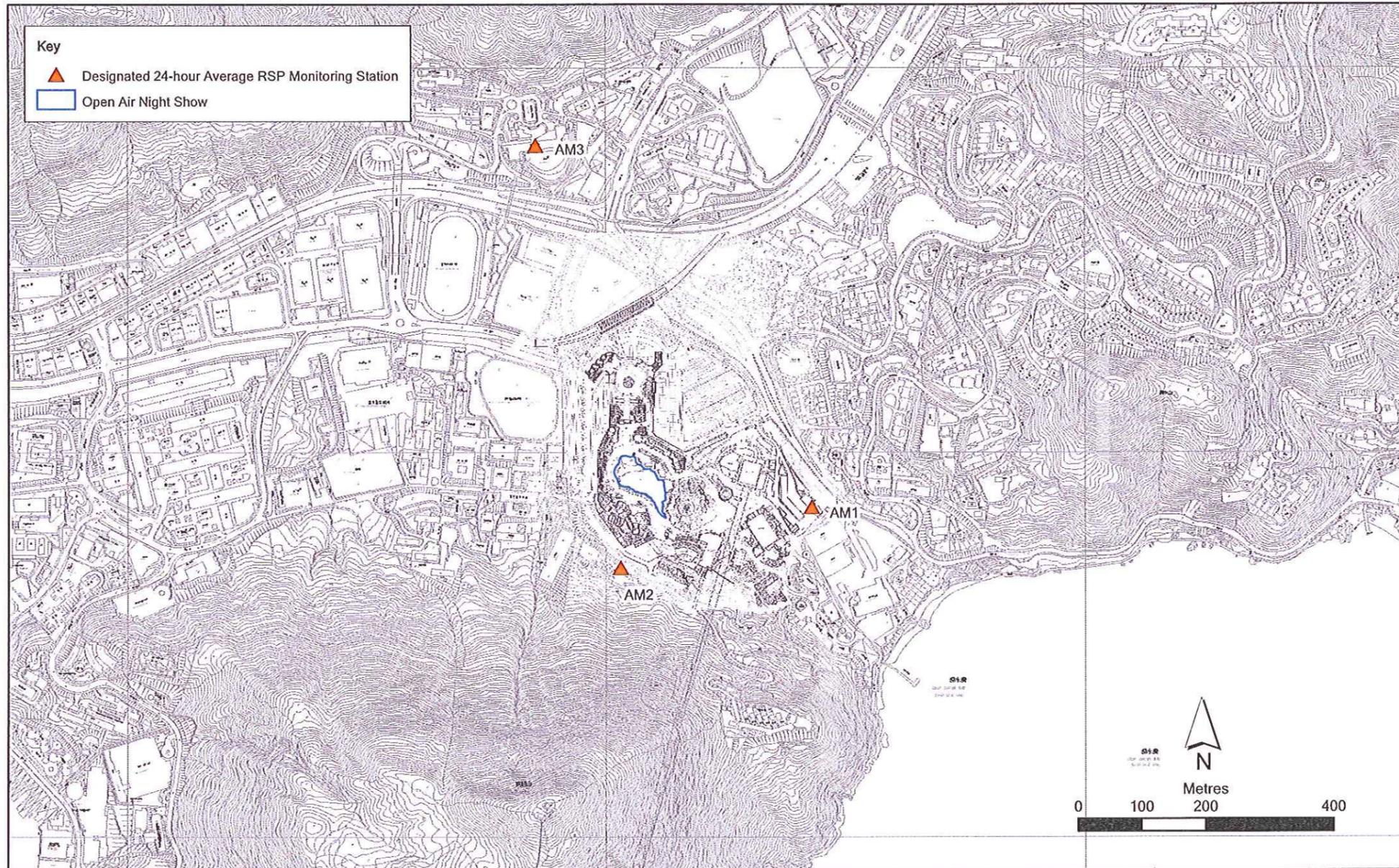


Figure 2.1

Designated 24-hour Average RSP Monitoring Stations during Operation of Open Air Night Show

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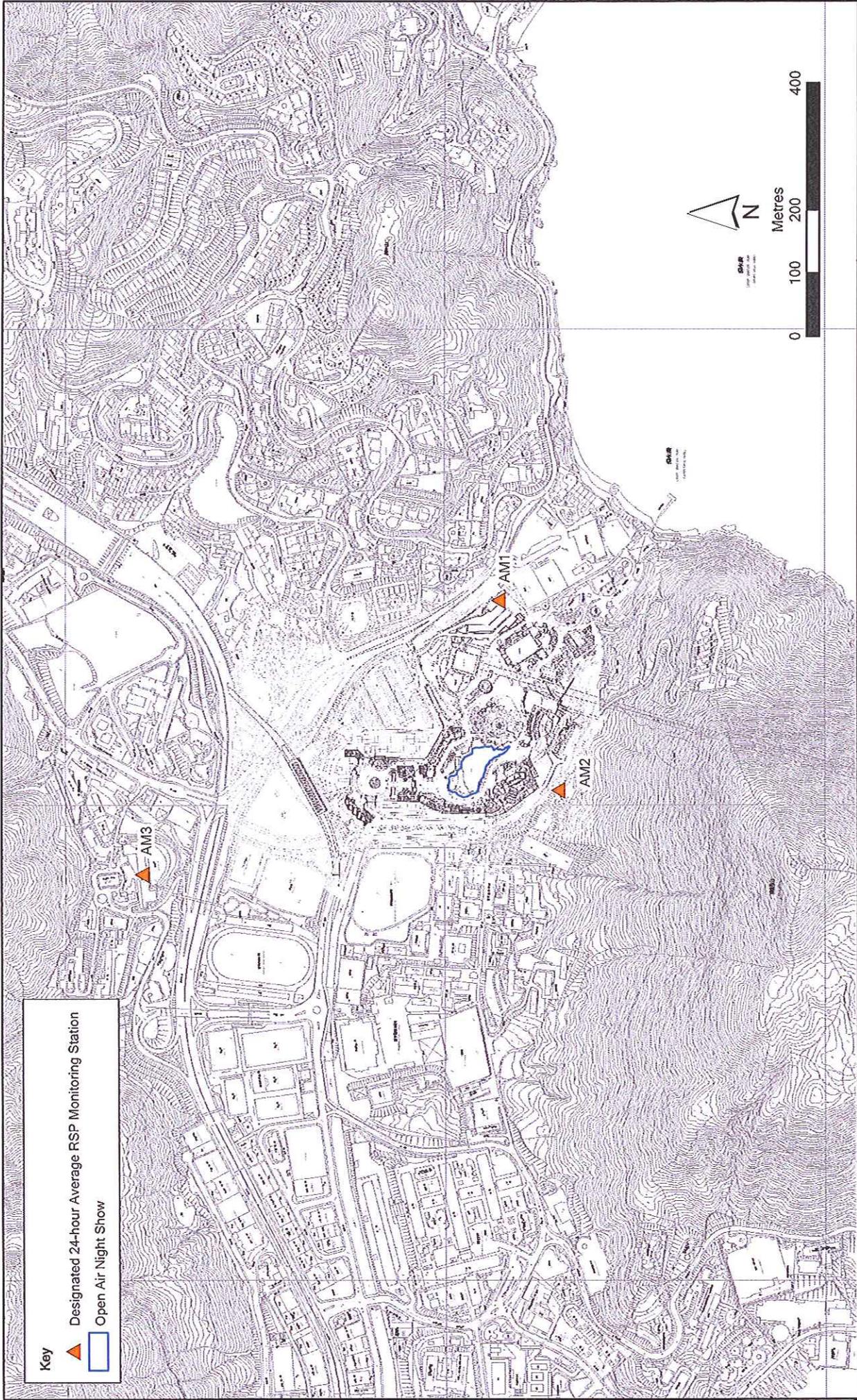


Figure 2.1

Designated 24-hour Average RSP Monitoring Stations during Operation of Open Air Night Show

### 3.2.3 *Monitoring Frequency*

The monitoring for both lagoon night show noise monitoring and daily operational noise monitoring were conducted twice per week - one on a normal weekday and one on a general holiday, including Sundays during this reporting month.

### 3.2.4 *Monitoring Methodology*

The sound level meters and calibrator used for the noise monitoring, as listed in *Table 3.2* below, complies with IEC 651: 1979 and 804:1985 (Type 1) specification.

*Table 3.2 Noise Measurement Equipments*

Monitoring Location		Monitoring Equipment
AON1	Open Area adjacent to Police Training School	RION NL-31 Sound Level Meter RION NC-73 calibrator
AON2	Old canteen building, Ocean Park	RION NL-31 Sound Level Meter RION NC-73 calibrator
AON3	Woodgreen Estate	RION NL-31 Sound Level Meter RION NC-73 calibrator
AON4	Manly Villa	RION NL-18 Sound Level Meter RION NC-73 calibrator
AON5	Hau Yuen	RION NL-31/ B&K 2238 Sound Level Meter RION NC-73 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 (IND-TM)*. Immediately prior to and following each noise measurement the accuracy of the monitoring equipments was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements were accepted if the calibration levels from before and after the noise measurement agree to within 1.0 dB.

The sound level meters and acoustic calibrator have been calibrated by a HOKLAS accredited laboratory every two years. The relevant calibration certificates are presented in *Annex B1*.

Noise measurements were made without the presence of fog and rain, and with steady wind speed and gusts not exceeding 5ms<sup>-1</sup> and 10 ms<sup>-1</sup>, respectively in accordance with international standards and practices <sup>(1)</sup>. Broadband measurement of L<sub>Aeq</sub>, L<sub>10</sub>, L<sub>90</sub>, L<sub>max</sub> and L<sub>min</sub> has been recorded at 100ms interval.

(1) ISO 11819-1:1997 and ISO/FDIS 13472-1:2001

### 3.2.5 Compliance Assessment

#### Fixed Plant Noise

As recommended in the EIA and stated in the EM&A Manual, OPC will follow the Action and Limit (A/L) Levels as recommended in EIA and EM&A Manual which are summarised in *Table 3.3*. In case exceedances are resulted from cumulative impacts, all steps stipulated in the Event/ Action Plan shall be followed.

*Table 3.3 Action and Limit Levels for Entertainment Noise*

Identification No.	Action Level	Limit Level
ON1/AON1	When documented complaint is received from any one of the sensitive receivers	L <sub>eq</sub> (30 min) 60 dB(A)
ON2/AON2		L <sub>eq</sub> (30 min) 60 dB(A)
ON3/AON3		L <sub>eq</sub> (30 min) 55 dB(A)
ON4/AON4		L <sub>eq</sub> (30 min) 55 dB(A)
ON5/AON5		L <sub>eq</sub> (30 min) 55 dB(A)

### 3.3 RESULTS OF NOISE MONITORING

The measured noise levels at the monitoring locations are given in *Annex B2* and graphically presented in *Annex B3*.

The background corrected Noise Levels complied with the Limit Levels at most of the monitoring stations during most of the monitoring dates. Noise exceedances were recorded at AON1 (Open Area adjacent to Police Training School) due to high background noise from the visitors and traffic during public holidays and AON3 (Woodgreen Estate) due to the traffic noise from Shouson Hill Road.

Detail discussion on noise exceedances are given in *Section 3.4* below.

### 3.4 SUMMARY OF NOISE EXCEEDANCES

Noise exceedances recorded during this reporting period are summarised in *Table 3.4* below.

**Table 3.4** *Summary of Daily Operational Noise Exceedance during this Reporting Period*

Date	Noise Monitoring Station	Measured Noise Level, dB(A)		Daily Operational Noise Level (Background Corrected) <sup>(a)</sup> , L <sub>eq</sub> (30min) dB(A)	Limit Level, L <sub>eq</sub> (30 min) dB(A)
		Daily Operational Noise Level, L <sub>eq</sub> (30min) dB(A)	Background Noise Level, L <sub>eq</sub> (15min) dB(A)		
26 June 2011 (Public Holiday)	AON1	66.3	65.2	62.6	60
30 June 2011 (Weekday)	AON3	64.3	63.4	56.9	55
3 July 2011 (Public Holiday)	AON1	64.9 (Night Show Noise Level)	63.8	61.6 (Night Show Noise Level (Background Corrected))	60
8 July 2011 (Weekday)	AON3	65.2	64.1	58.7	55
12 July 2011 (Weekday)	AON3	66.5	64.1	62.9	55
19 July 2011 (Weekday)	AON3	65.2 (Night Show Noise Level)	64.1	58.8 (Night Show Noise Level (Background Corrected))	55
19 July 2011 (Weekday)	AON3	65.3 (Night Show Noise Level)	64.5	57.5 (Night Show Noise Level (Background Corrected))	55

**Note:**  
(a) The Background Corrected Noise Levels were either measured in front of a façade at AON2, AON3, AON4 and AON5 or with façade correction of 3 dB(A) at AON1.

*AON1 – High Background Noise during Public Holidays*

The monitoring station AON1 is directly facing the bus terminus of the Ocean Park. The measured noise levels were dominated by the bus movements, ie. bus moving in and out of the terminus to pick up visitors leaving the Ocean Park during evening time. The measured background noise levels were in the range of 64 to 65 dB(A), ie 4 to 5 dB(A) higher than the Limit Level, during the two days with noise exceedances as they were public holidays/ Sundays with more visitors (see Table 3.4).

*AON3 – Traffic Noise from Shouson Hill Road*

The exceedances at AON3 were mainly due to the traffic at Shouson Hill Road.

*Summary*

As mentioned above, the noise exceedances were due to the bus movements at the bus terminus during public holidays and traffic from Shouson Hill Road, ie not due to the fixed plant noise sources or the lagoon night show from the Ocean Park.

## OVERALL CONCLUSIONS

The Open-air Night Show commenced on 27 January 2011. According to the requirements set out in the Environmental Permit (EP) and the updated EM&A Manual, air quality and noise monitoring shall be carried out during the first year of the operation of Open-air Night Show. This is the 6<sup>th</sup> air quality and noise monitoring report which summarises the impact monitoring results during the reporting period from 27 June to 26 July 2011.

24-hr average respirable suspended particulates (RSP) monitoring were conducted at three designated monitoring stations, one on the rooftop of the Administrative Building in OP (AM1), one on the Landscape Storage Area in Ocean Park (AM2) and one on the Rooftop of Main Medical Block of Graham Hospital (AM3) on 22 July 2011. All monitored 24-hour average RSP concentrations measured at AM1, AM2 and AM3 complied with the Action/Limit (A/L) Level.

Daily operational noise and lagoon night show noise monitoring were carried out at five designated monitoring stations during this reporting period. Out of the 5 stations, noise exceedances were recorded at AON1 (Open Area adjacent to Police Training School) and AON3 (Orchid Valley) due to noise emanating from the bus terminus, high background noise from visitors and traffic during the public holidays, and the traffic noise from Shouson Hill Road.

Annex A1

## HVS Calibration Report



## ALS Technichem (HK) Pty Ltd

### REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

**CONTACT:** MS WINNIE KO  
**CLIENT:** ERM HONG KONG  
**ADDRESS:** 21/F, LINCOLN HOUSE, 979 KING`S ROAD,  
TAIKOO PLACE, ISLAND EAST,  
QUARRY BAY, HONG KONG.  
**PROJECT:** OPC AIR QUALITY MONITORING FOR OPERATION  
OF SYMBIO SHOW

**WORK ORDER:** HK1116722  
**LABORATORY:** HONG KONG  
**DATE RECEIVED:** 15/06/2011  
**DATE OF ISSUE:** 19/07/2011  
**SAMPLE TYPE:** EQUIPMENT  
**No. of SAMPLES:** 3

#### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

Scope of Test: Flow Rate

Description: High Volume Sampler

Brand Name: TISCH

Model No.: --

Serial No.: --

Equipment No.: HK647, HK649, HK651

Date of Calibration: 15 June, 2011

#### NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

#### ISSUING LABORATORY: HONG KONG

##### Address

ALS Technichem (HK) Pty Ltd

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1-3 Wing Yip Street

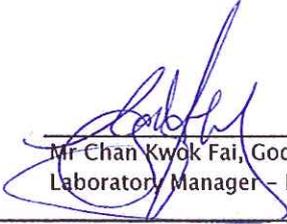
Kwai Chung

HONG KONG

**Phone:** 852-2610 1044

**Fax:** 852-2610 2021

**Email:** [hongkong@alsglobal.com](mailto:hongkong@alsglobal.com)

  
Mr Chan Kwok Fai, Godfrey  
Laboratory Manager - Hong Kong

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## Calibration Report for High Volume Sampler (RSP Sampler)

Report No. : HK1116722  
 Location : (AM1)  
 Brand Name : TISCH

Equipment No. : HK649  
 Calibration date : 15/06/2011  
 Calibration Due date : 15/09/2011

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition					
Ambient			Seasonal		
Temperature, Ta	304	K	Temperature, Ts	300	K
Pressure, Pa	1005.0	hPa	Pressure, Ps	1010.4	hPa
Orifice Transfer Standards Information					
Equipment No.	TE-5025A (S/N 9833620)	Slope, $m_c$	1.26117	Intercept, $b_c$	-0.01972
Last Calibration Date	23-February-2011	$Q_a = [\sqrt{(\Delta H \cdot Ta/Pa) - b_c}] / m_c$			
Next Calibration Date	23-February-2012				

Calibration of RSP						
Calibration Point	Manometer Reading H(inches of water)			$Q_{std}$ ( $m^3/min$ ) X-axis	Continuous Flow Recorder, W (CFM)	$W((Ta+30)/Pa)^{1/2}$ Y-axis
	(up)	(down)	( $\Delta H$ )			
1	6.5	6.1	12.6	1.5636	55	31.7068
2	5.5	5.1	10.6	1.4355	50	28.8244
3	4.5	4.1	8.6	1.2945	44	25.3655
4	2.9	2.7	5.6	1.0476	34	19.6006
5	2.2	1.7	3.9	0.8769	.25	14.4122

By Linear Regression of Y Vs X

Correlation coefficient, R = 0.9987  
 Slope, m = 24.9106  
 Intercept, b = -6.9972  
 Calibration result :

\*If the correlation coefficient, R is < 0.9900. Checking and recalibration are required.

Remarks :

---



---

Calibration by : Sam Wong  
 Signature : Sam Wong  
 Date : 15/06/2011

Checked by : Iris Lin  
 Signature : Iris Lin  
 Date : 15/06/2011

# ALS Technichem (HK) Pty Ltd.



## Calibration Report for High Volume Sampler (RSP Sampler)

Work Order No. : HK1116722  
 Location : (AM2)  
 Brand Name : TISCH

ALS Equipment No. : HK647  
 Calibration date : 15/06/2011  
 Calibration Due date : 15/09/2011

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition					
Ambient			Seasonal		
Temperature, Ta	304	K	Temperature, Ts	300	K
Pressure, Pa	1005.0	hPa	Pressure, Ps	1010.4	hPa
Orifice Transfer Standards Information					
Equipment No.	TE-5025A (S/N 9833620)	Slope, m <sub>c</sub>	1.26117	Intercept, b <sub>c</sub>	-0.01972
Last Calibration Date	23-February-2011	$Q_a = [\sqrt{(\Delta H \cdot Ta/Pa) - b_c}] / m_c$			
Next Calibration Date	23-February-2012				

Calibration of RSP						
Calibration Point	Manometer Reading H(inches of water)			Q <sub>std</sub> (m <sup>3</sup> /min)	Continuous Flow Recorder, W (CFM)	W((Ta+30)/Pa) <sup>1/2</sup>
	(up)	(down)	(ΔH)	X-axis	W (CFM)	Y-axis
1	6.0	6.1	12.1	1.5326	56	32.2833
2	5.3	5.2	10.5	1.4287	51	29.4009
3	4.1	4.1	8.2	1.2644	46	26.5184
4	2.6	2.7	5.3	1.0196	35	20.1771
5	1.6	1.9	3.5	0.8315	28	16.1417

By Linear Regression of Y Vs X

Correlation coefficient, R = 0.9987  
 Slope, m = 22.9428  
 Intercept, b = -2.9797  
 Calibration result :

\*If the correlation coefficient, R is < 0.9900. Checking and recalibration are required.

Remarks : \_\_\_\_\_

Calibration by : Sam Wong  
 Signature : Sam Wong  
 Date : 15/06/2011

Checked by : Iris Lin  
 Signature : Iris Lin  
 Date : 15/06/2011



## Calibration Report for High Volume Sampler (RSP Sampler)

Report No. : HK1116722  
 Location : (AM3)  
TISCH

Equipment No. : HK651  
 Calibration date : 15/06/2011  
 Calibration Due date : 15/09/2011

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition					
Ambient			Seasonal		
Temperature, Ta	303	K	Temperature, Ts	300	K
Pressure, Pa	1005.0	hPa	Pressure, Ps	1010.4	hPa
Orifice Transfer Standards Information					
Equipment No.	TE-5025A (S/N 9833620)	Slope, $m_c$	1.26117	Intercept, $b_c$	-0.01972
Last Calibration Date	23-February-2011	$Q_a = [\sqrt{(\Delta H \cdot Ta/Pa) - b_c}] / m_c$			
Next Calibration Date	23-February-2012				

Calibration of RSP						
Calibration Point	Manometer Reading H(inches of water)			$Q_{std}$ ( $m^3/min$ ) X-axis	Continuous Flow Recorder, W (CFM)	$W((Ta+30)/Pa)^{1/2}$ Y-axis
	(up)	(down)	( $\Delta H$ )			
1	6.2	6.4	12.6	1.5611	53	30.5081
2	5.1	5.5	10.6	1.4331	47	27.0543
3	4.1	4.5	8.6	1.2924	41	23.6006
4	2.5	3.0	5.5	1.0367	26	14.9662
5	1.3	2.0	3.3	0.8065	10	5.7562

By Linear Regression of Y Vs X

Correlation coefficient, R = 0.9960  
 Slope, m = 32.7138  
 Intercept, b = -19.7288  
 Calibration result :

\*If the correlation coefficient, R is < 0.9900. Checking and recalibration are required.

Remarks :

\_\_\_\_\_

Calibration by : Sam Wong  
 Signature : Sam Wong  
 Date : 15/06/2011

Checked by : Iris Lin  
 Signature : Iris Lin  
 Date : 15/06/2011



## ALS Technichem (HK) Pty Ltd

### REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

<b>CONTACT:</b>	MS WINNIE KO	<b>WORK ORDER:</b>	HK1117904
<b>CLIENT:</b>	ERM HONG KONG	<b>LABORATORY:</b>	HONG KONG
<b>ADDRESS:</b>	21/F, LINCOLN HOUSE, 979 KING `S ROAD, TAIKOO PLACE, ISLAND EAST, QUARRY BAY, HONG KONG.	<b>DATE RECEIVED:</b>	22/07/2011
<b>PROJECT:</b>	OPC AIR QUALITY MONITORING FOR OPERATION OF SYMBIO SHOW	<b>DATE OF ISSUE:</b>	23/07/2011
		<b>SAMPLE TYPE:</b>	EQUIPMENT
		<b>No. of SAMPLES:</b>	1

#### COMMENTS

It is certified that the item under calibration/checking has been calibrated/checked by corresponding calibrated equipment in the laboratory.

Maximum Tolerance and calibration frequency stated in the report, unless otherwise stated, the internal acceptance criteria of ALS will be followed.

Scope of Test: Flow Rate

Description: High Volume Sampler

Brand Name: TISCH

Model No.: --

Serial No.: --

Equipment No.: HK651

Date of Calibration: 22 July, 2011

#### NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

#### ISSUING LABORATORY: HONG KONG

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Mr. Fung Lim Chee, Richard  
General Manager -  
Greater China & Hong Kong

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# ALS Technichem (HK) Pty Ltd.



## Calibration Report for High Volume Sampler (RSP Sampler)

Report No. : HK1117904  
 Location : (AM3)  
TISCH

Equipment No. : HK651  
 Calibration date : 22/07/2011  
 Calibration Due date : 22/10/2011

### CALIBRATION OF CONTINUOUS FLOW RECORDER

Ambient Condition					
Ambient			Seasonal		
Temperature, Ta	304.5	K	Temperature, Ts	300	K
Pressure, Pa	1005.0	hPa	Pressure, Ps	1010.4	hPa
Orifice Transfer Standards Information					
Equipment No.	TE-5025A (S/N 9833620)	Slope, $m_c$	1.26117	Intercept, $b_c$	-0.01972
Last Calibration Date	23-February-2011	$Q_a = [\sqrt{(\Delta H \cdot Ta/Pa) - b_c}] / m_c$			
Next Calibration Date	23-February-2012				

Calibration of RSP						
Calibration Point	Manometer Reading			$Q_{std}$ ( $m^3/min$ ) X-axis	Continuous Flow Recorder, W (CFM)	$W((Ta+30)/Pa)^{1/2}$ Y-axis
	(up)	(down)	( $\Delta H$ )			
1	5.6	7.1	12.7	1.5710	51	29.4229
2	4.2	5.4	9.6	1.3679	42	24.2306
3	3.2	4.3	7.5	1.2109	34	19.6153
4	1.8	2.9	4.7	0.9618	20	11.5384
5	0.9	2.0	2.9	0.7589	5	2.8846

By Linear Regression of Y Vs X

Correlation coefficient, R = 0.9953  
 Slope, m = 32.4906  
 Intercept, b = -20.6096  
 Calibration result :

\*If the correlation coefficient, R is < 0.9900. Checking and recalibration are required.

Remarks :

Calibration by : Sam Wong  
 Signature : Sam Wong  
 Date : 22/07/2011

Checked by : Vico Chan  
 Signature : Vico Chan  
 Date : 22/07/2011

Annex A2

## Laboratory Report

# ALS Technichem (HK) Pty Ltd

**ALS Laboratory Group**  
ANALYTICAL CHEMISTRY & TESTING SERVICES



## CERTIFICATE OF ANALYSIS

Client	: ERM HONG KONG	Laboratory	: ALS Technichem HK Pty Ltd	Page	: 1 of 2
Contact	: MS CELINE LEE	Contact	: Chan Kwok Fai, Godfrey	Work Order	: HK1117179
Address	: 21/F, LINCOLN HOUSE, 979 KING'S ROAD, TAIKOO PLACE, ISLAND EAST, QUARRY BAY, HONG KONG	Address	: 11/F., Chung Shun Knitting Centre, 1 - 3 Wing Yip Street Kwai Chung, N.T., Hong Kong		
E-mail	: Celine.Lee@erm.com	E-mail	: Godfrey.Chan@alsenviro.com		
Telephone	: +852 2271 3000	Telephone	: +852 2610 1044		
Facsimile	: +852 2723 5660	Facsimile	: +852 2610 2021		
Project	: OPC AIR QUALITY MONITORING FOR OPERATION OF SYMBIO SHOW	Quote number	: HK/1453a/2010	Date Samples Received	: 25-JUL-2011
Order number	: ----			Issue Date	: 29-JUL-2011
C-O-C number	: ----			No. of samples received	: 3
Site	: OCEAN PARK			No. of samples analysed	: 3

### General Comments

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release. When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes. The completion date of analysis is: 29-JUL-2011

Key: LOR = Limit of reporting; CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

Specific comments for Work Order: HK1117179

Sample(s) were collected by ALS Technichem (HK) staff on 25 July, 2011.

Sample(s) analysed and reported on an as received basis.

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This document has been electronically signed by those names that appear on this report and are the authorised signatories. Electronic signing has been carried out in compliance with procedures specified in the Electronic Transactions Ordinance of Hong Kong, Chapter 553, Section 6.

Signatories	Position	Authorised results for
Fung Lim Chee, Richard	General Manager	Inorganics

**ALS Laboratory Group**  
Trading Name: **ALS Technichem (HK) Pty Ltd**  
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A Campbell Brothers Limited Company

Annex A3

Detailed Summary and  
Graphical Presentation of  
the Cumulative Results  
since Commencement of  
Open-air Night Show

Annex A3  
 Measured 24-hour Average RSP Concentrations

RSP Monitoring Station : AM1 (Rooftop of Administration Building in Ocean Park)

Start		Finish		Weather	Filter Weight (g)		Elapsed Time Reading		Sampling Time (hrs)	Flow Rate (m <sup>3</sup> /min)			RSP Conc. (µg/m <sup>3</sup> )	Limit Level (µg/m <sup>3</sup> )	Filter ID
Date	Time	Date	Time		Initial	Final	Initial	Final		Initial	Final	Average			
28-Jan-11	17:00	29-Jan-11	17:00	Sunny	2.8652	2.9914	17711.68	17735.95	24.27	1.39	1.39	1.39	63	180	202102
04-Feb-11	17:00	05-Feb-11	17:00	Sunny	2.8755	3.0567	17735.95	17760.30	24.35	1.39	1.43	1.41	88	180	202099
12-Feb-11	17:00	13-Feb-11	17:00	Cloudy	2.8808	3.0820	17760.30	17784.33	24.03	1.39	1.39	1.39	101	180	202100
20-Feb-11	17:00	21-Feb-11	17:00	Cloudy	2.8770	2.9497	17784.33	17808.45	24.12	1.39	1.39	1.39	36	180	202101
22-Mar-11	17:00	23-Mar-11	17:00	Cloudy	2.7967	2.8948	17808.45	17833.61	25.16	1.49	1.49	1.49	44	180	202264
10-Apr-11	17:00	11-Apr-11	17:00	Cloudy	2.7924	2.9167	17842.11	17866.14	24.03	1.08	1.08	1.08	80	180	202288
11-May-11	17:00	12-May-11	17:00	Sunny	2.7992	2.8443	17866.14	17890.29	24.15	1.04	1.04	1.04	30	180	202567
16-Jun-11	17:00	17-Jun-11	17:00	Sunny	2.7956	2.8404	17890.39	17914.31	23.92	1.14	1.14	1.14	27	180	202570
22-Jul-11	17:00	23-Jul-11	17:00	Sunny	2.8046	2.8484	18009.37	18033.12	23.75	1.21	1.11	1.16	26	180	202574
												Min.	26		
												Max.	101		
												Average	55		

Annex A3  
 Measured 24-hour Average RSP Concentrations

RSP Monitoring Station : AM2 (Landscape Storage Area in Ocean Park)

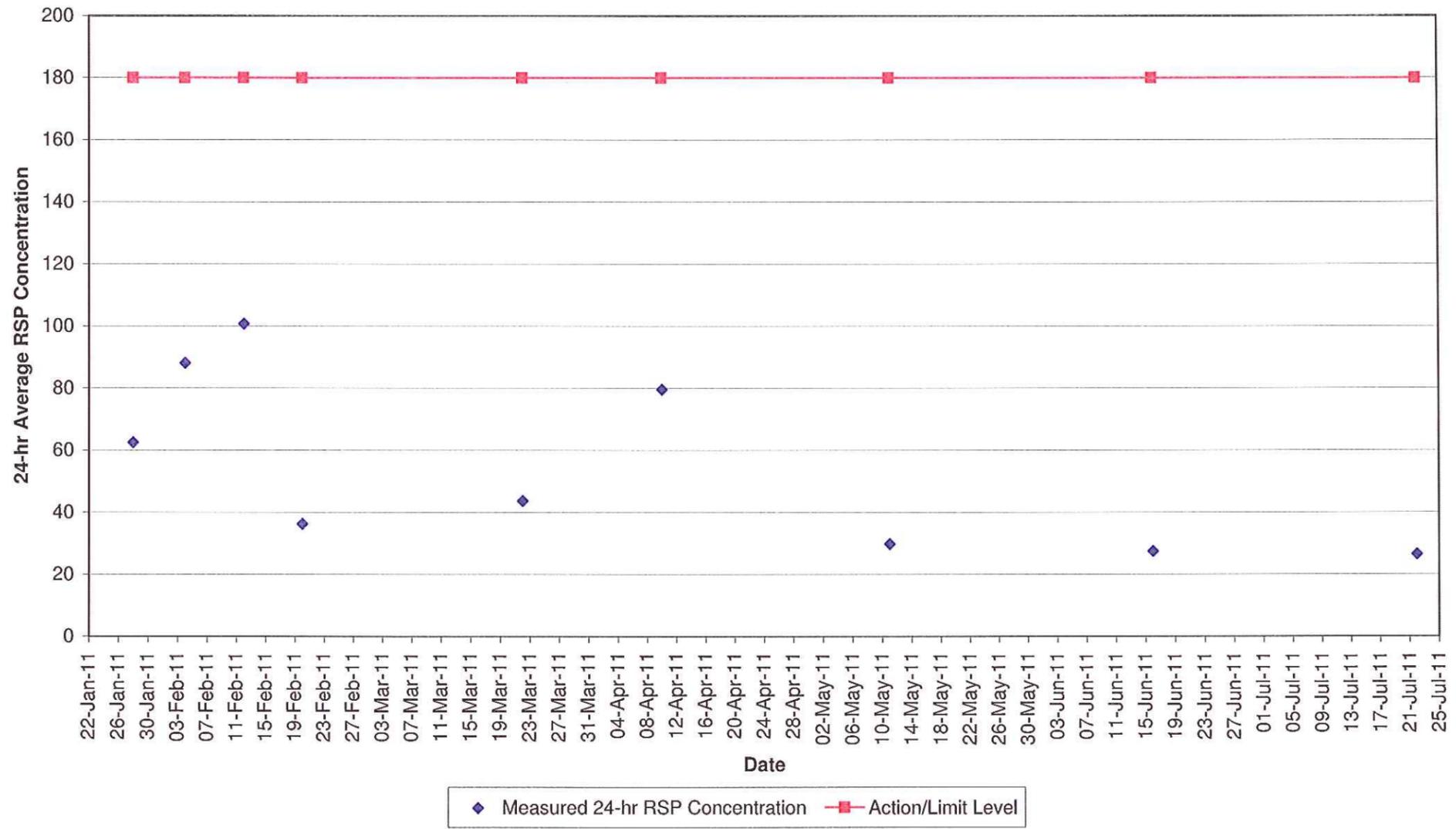
Start		Finish		Weather	Filter Weight (g)		Elapsed Time Reading		Sampling Time (hrs)	Flow Rate (m <sup>3</sup> /min)			RSP Conc. (µg/m <sup>3</sup> )	Limit Level (µg/m <sup>3</sup> )	Filter ID
Date	Time	Date	Time		Initial	Final	Initial	Final		Initial	Final	Average			
28-Mar-11	17:00	29-Mar-11	17:00	Cloudy	2.7923	2.8849	5069.23	5092.98	23.75	1.04	1.04	1.04	62	180	202287
04-Apr-11	17:00	05-Apr-11	17:00	Cloudy	2.7884	2.9238	5092.98	5116.98	24.00	1.47	1.47	1.47	64	180	202290
10-Apr-11	17:00	11-Apr-11	17:00	Cloudy	2.7727	2.8799	5116.98	5140.98	24.00	1.45	1.45	1.45	51	180	202291
18-Apr-11	17:00	19-Apr-11	17:00	Sunny	2.8004	2.9833	5140.98	5164.98	24.00	1.43	1.43	1.43	89	180	202292
11-May-11	17:00	12-May-11	17:00	Sunny	2.8064	2.8596	5164.98	5188.98	24.00	1.43	1.43	1.43	26	180	202568
16-Jun-11	17:00	17-Jun-11	17:00	Sunny	2.7984	2.8285	5189.07	5213.07	24.00	1.19	1.19	1.19	18	180	202571
22-Jul-11	17:00	23-Jul-11	17:00	Sunny	2.7834	2.8283	5213.07	5237.07	24.00	1.19	1.19	1.19	26	180	202573
												Min.	18		
												Max.	89		
												Average	48		

Annex A3  
 Measured 24-hour Average RSP Concentrations

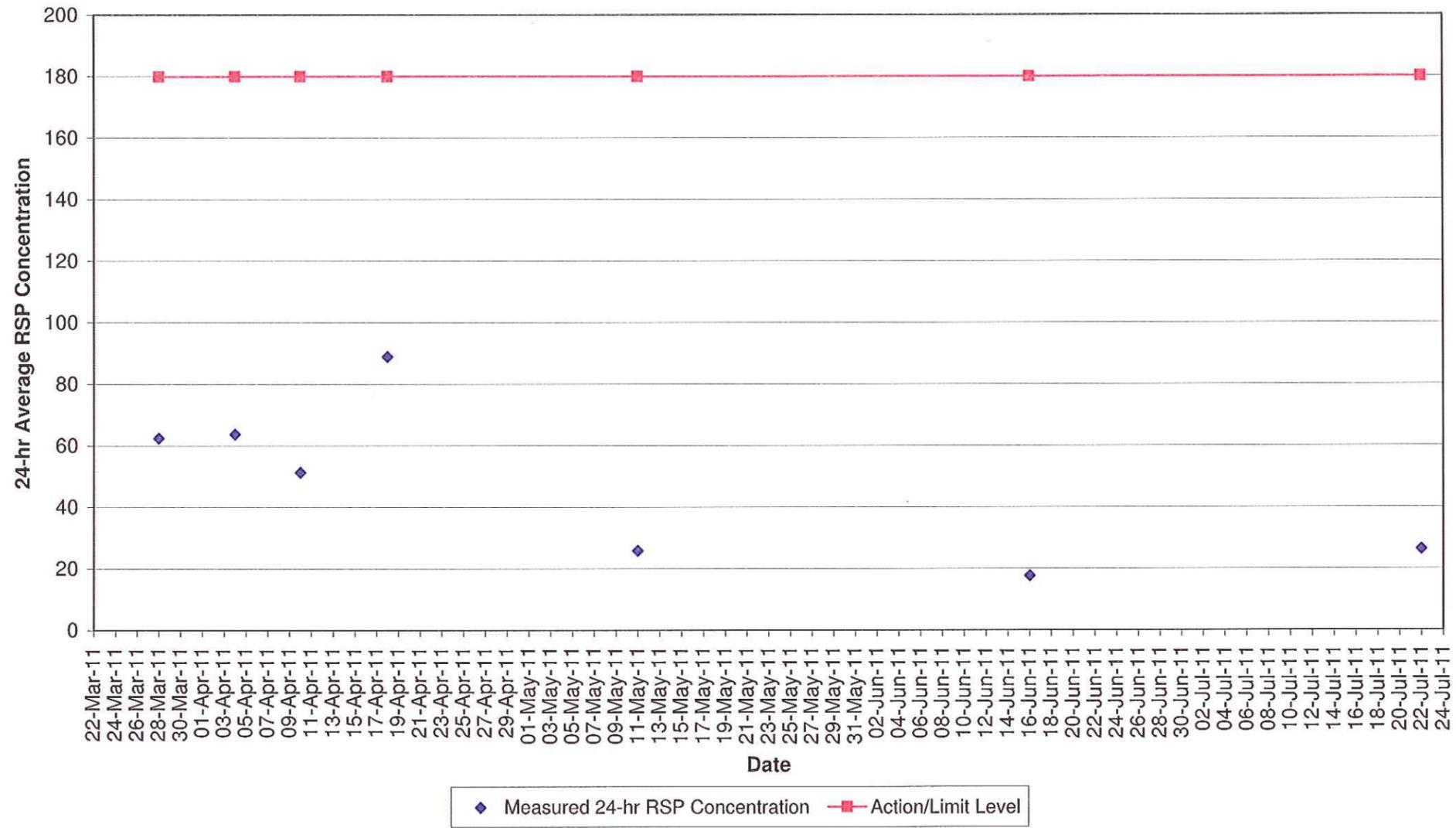
RSP Monitoring Station : AM3 (Rooftop of Main Medical Block of Graham Hospital)

Start		Finish		Weather	Filter Weight (g)		Elapsed Time Reading		Sampling Time (hrs)	Flow Rate (m <sup>3</sup> /min)			RSP Conc. (µg/m <sup>3</sup> )	Limit Level (µg/m <sup>3</sup> )	Filter ID
Date	Time	Date	Time		Initial	Final	Initial	Final		Initial	Final	Average			
28-Mar-11	17:00	29-Mar-11	17:00	Cloudy	2.7946	2.9435	13068.67	13092.67	24.00	0.91	0.91	0.91	114	180	202265
04-Apr-11	17:00	05-Apr-11	17:00	Cloudy	2.8005	2.9049	13092.67	13116.68	24.01	0.65	0.65	0.65	112	180	202289
10-Apr-11	17:00	11-Apr-11	17:00	Sunny	2.7948	2.8825	13116.68	13140.66	23.98	0.70	0.70	0.70	87	180	202294
18-Apr-11	17:00	19-Apr-11	17:00	Sunny	2.7966	2.9578	13140.66	13164.68	24.02	0.70	0.70	0.70	160	180	202295
11-May-11	17:00	12-May-11	17:00	Sunny	2.7906	2.8330	13164.68	13188.69	24.01	0.74	0.74	0.74	40	180	202566
16-Jun-11	17:00	17-Jun-11	17:00	Sunny	2.8008	2.8294	13188.72	13212.72	24.00	1.08	1.08	1.08	18	180	202569
22-Jul-11	17:00	23-Jul-11	17:00	Sunny	2.7983	2.8416	13212.84	13236.84	24.00	1.15	1.17	1.16	26	180	202572
												Min.	18		
												Max.	160		
												Average	79		

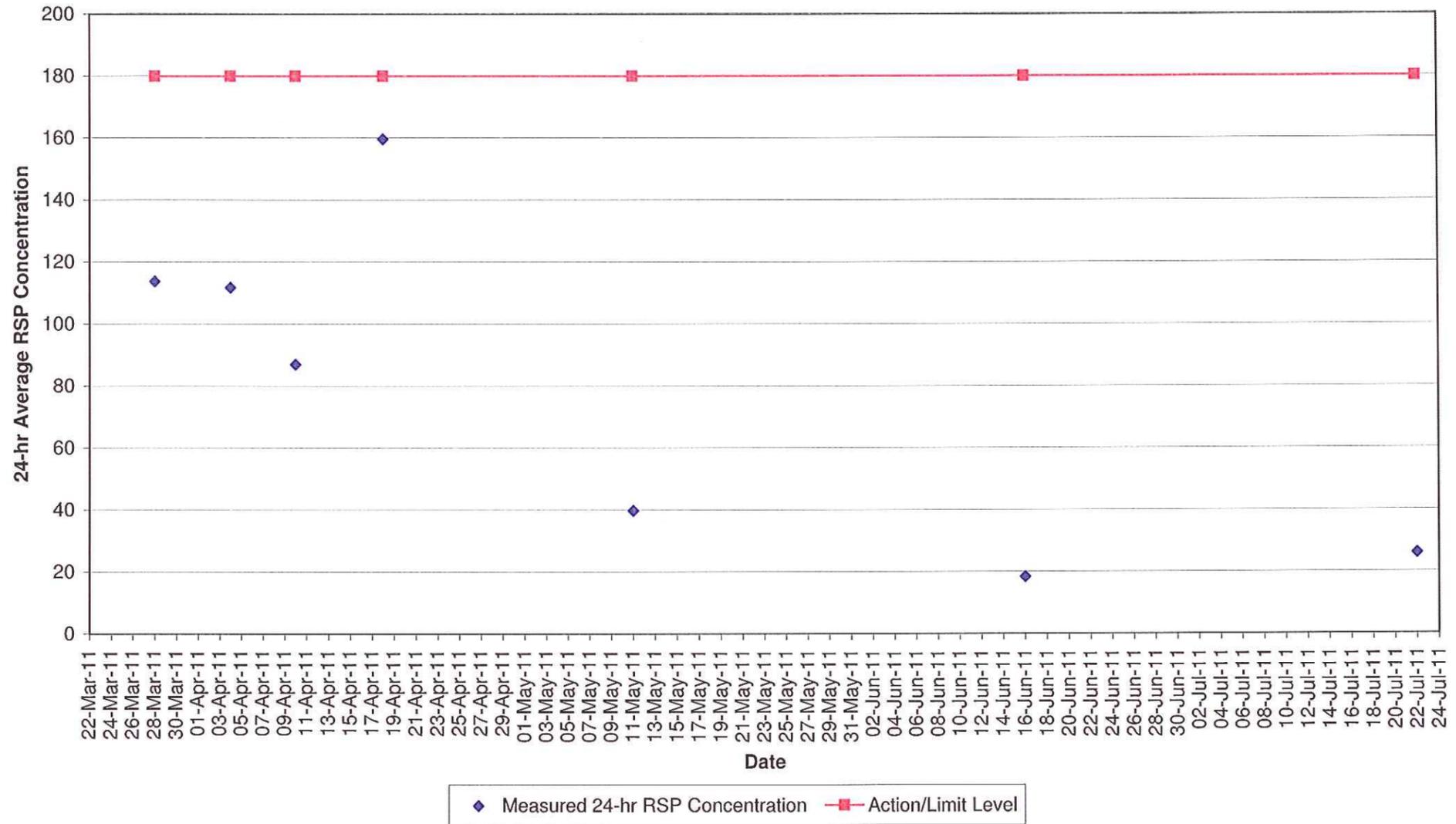
Measured 24-hr Average RSP Concentration  
AM1 - Rooftop of Administrative Building (Former Staff Quarters) in Ocean Park



Measured 24-hr Average RSP Concentration  
AM 2 - Landscape Storage Area in Ocean Park



Measured 24-hr Average RSP Concentration  
AM3 - Rooftop of Main Medical Block of Graham Hospital



Annex A4

Recorded RSP  
Concentrations at EPD's  
AQMSs in Tung Chung,  
Shatin, Tai Po, Yuen Long  
and Tap Mun on *22 July*  
*2011*

*Annex A4 Recorded RSP Concentrations at EPD's AQMSs in Tung Chung, Shatin, Tai Po, Yuen Long, and Tap Mun on 22 July 2011*  
22 July 2011

Tung Chung

Date & Time	RSP
23-07-2011 16:00	21.1
23-07-2011 15:00	19.8
23-07-2011 14:00	20.5
23-07-2011 13:00	20.8
23-07-2011 12:00	20.9
23-07-2011 11:00	18.4
23-07-2011 10:00	17.4
23-07-2011 9:00	19.5
23-07-2011 8:00	-
23-07-2011 7:00	-
23-07-2011 6:00	-
23-07-2011 5:00	-
23-07-2011 4:00	-
23-07-2011 3:00	-
23-07-2011 2:00	-
23-07-2011 1:00	-
23-07-2011 0:00	-
22-07-2011 23:00	-
22-07-2011 22:00	-
22-07-2011 21:00	-
22-07-2011 20:00	-
22-07-2011 19:00	-
22-07-2011 18:00	-
22-07-2011 17:00	-

Note: '-' No data is available from EPD's website

Shatin

Date & Time	RSP
23-07-2011 16:00	25.1
23-07-2011 15:00	22.3
23-07-2011 14:00	22.3
23-07-2011 13:00	22.6
23-07-2011 12:00	27
23-07-2011 11:00	27.9
23-07-2011 10:00	31.5
23-07-2011 9:00	26.4
23-07-2011 8:00	27.7
23-07-2011 7:00	24.1
23-07-2011 6:00	23.5
23-07-2011 5:00	22.9
23-07-2011 4:00	20.9
23-07-2011 3:00	20.5
23-07-2011 2:00	20.9
23-07-2011 1:00	20.3
23-07-2011 0:00	21.2
22-07-2011 23:00	22.7
22-07-2011 22:00	23.8
22-07-2011 21:00	24.7
22-07-2011 20:00	27.9
22-07-2011 19:00	28.8
22-07-2011 18:00	31.1
22-07-2011 17:00	23.3

### Tai Po

Date & Time	RSP
23-07-2011 16:00	26.3
23-07-2011 15:00	24
23-07-2011 14:00	13.2
23-07-2011 13:00	27.7
23-07-2011 12:00	23.7
23-07-2011 11:00	22.5
23-07-2011 10:00	25.6
23-07-2011 9:00	27.6
23-07-2011 8:00	33
23-07-2011 7:00	29
23-07-2011 6:00	23.6
23-07-2011 5:00	23.5
23-07-2011 4:00	22.6
23-07-2011 3:00	21.5
23-07-2011 2:00	24.3
23-07-2011 1:00	23.8
23-07-2011 0:00	26.9
22-07-2011 23:00	25.6
22-07-2011 22:00	28
22-07-2011 21:00	26.8
22-07-2011 20:00	28.8
22-07-2011 19:00	33.1
22-07-2011 18:00	39.5
22-07-2011 17:00	27.9

### Yuen Long

Date & Time	RSP
23-07-2011 16:00	27.1
23-07-2011 15:00	23.8
23-07-2011 14:00	23.7
23-07-2011 13:00	31.9
23-07-2011 12:00	25.9
23-07-2011 11:00	18.8
23-07-2011 10:00	21.4
23-07-2011 9:00	24.1
23-07-2011 8:00	27
23-07-2011 7:00	28.6
23-07-2011 6:00	27.2
23-07-2011 5:00	25.2
23-07-2011 4:00	24.3
23-07-2011 3:00	28
23-07-2011 2:00	30.5
23-07-2011 1:00	27
23-07-2011 0:00	33.2
22-07-2011 23:00	33.2
22-07-2011 22:00	32.7
22-07-2011 21:00	32.8
22-07-2011 20:00	34.3
22-07-2011 19:00	34.6
22-07-2011 18:00	32.2
22-07-2011 17:00	26.3

Tap Mun

Date & Time	RSP
23-07-2011 16:00	25.9
23-07-2011 15:00	28.6
23-07-2011 14:00	26.3
23-07-2011 13:00	23.9
23-07-2011 12:00	26
23-07-2011 11:00	24.4
23-07-2011 10:00	25.6
23-07-2011 9:00	27
23-07-2011 8:00	24.8
23-07-2011 7:00	31
23-07-2011 6:00	21.2
23-07-2011 5:00	20.5
23-07-2011 4:00	20.1
23-07-2011 3:00	21.3
23-07-2011 2:00	21.8
23-07-2011 1:00	21.5
23-07-2011 0:00	22
22-07-2011 23:00	22.7
22-07-2011 22:00	24.1
22-07-2011 21:00	22.6
22-07-2011 20:00	23
22-07-2011 19:00	22.4
22-07-2011 18:00	24.2
22-07-2011 17:00	28.7

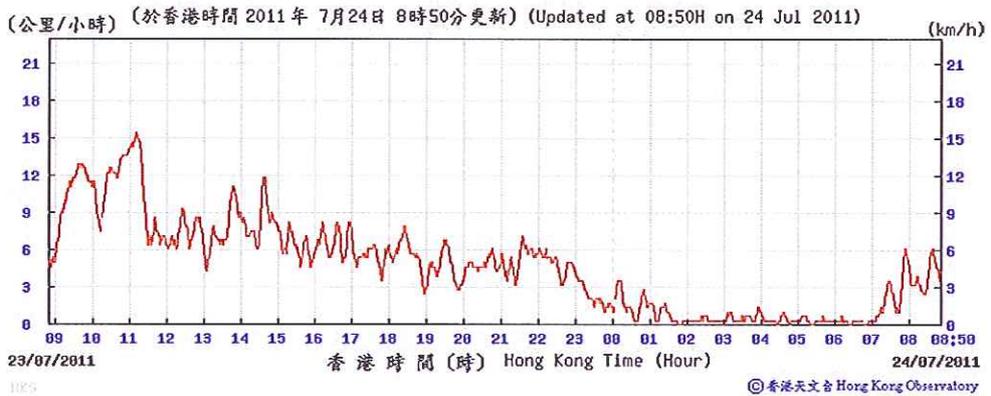
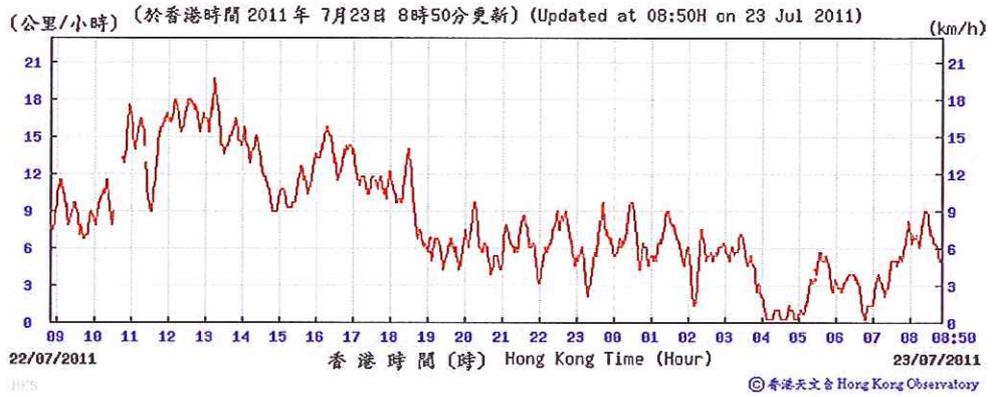
Annex A5

Weather Data Recorded at  
HKO's Weather Station in  
Wong Chuk Hang on 22  
*July 2011*

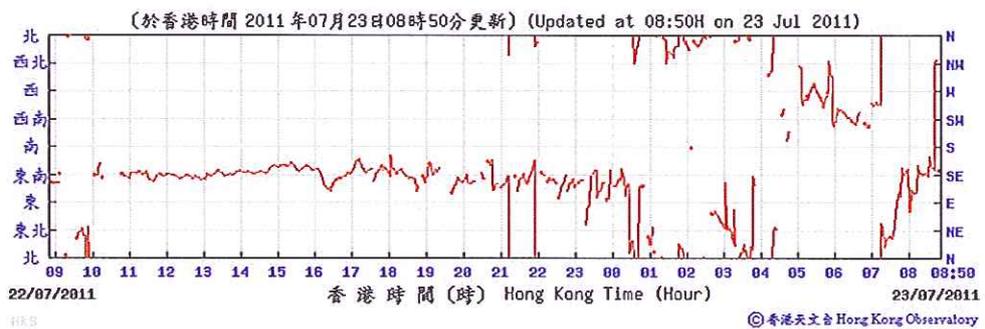
Recorded Weather Data at HKO's Weather Station in Wong Chuk Hang on 22 July 2011

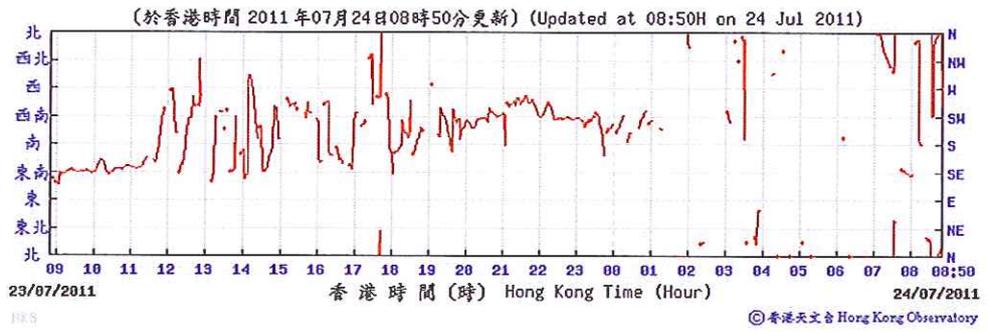
22 July 2011

Prevailing Wind Speed

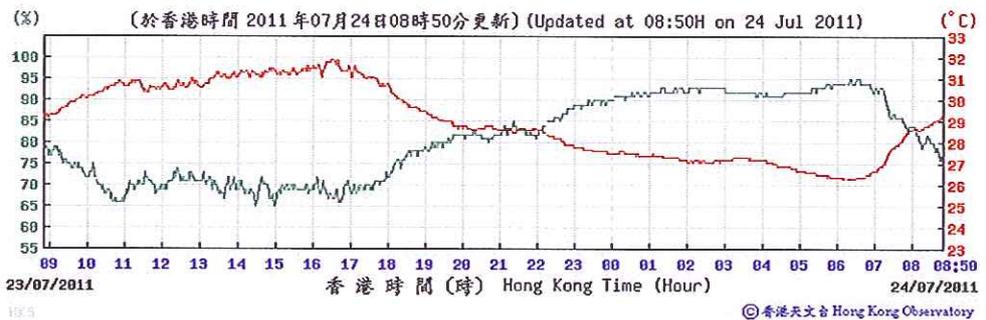


Prevailing Wind Direction





### Ambient Temperature and Relative Humidity



Annex B1

Calibration Certificates of  
the Noise Measurement  
Equipment



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C113972

## Certificate of Calibration

*This is to certify that the equipment*

*Description : Sound Level Calibrator*

*Manufacturer : Rion*

*Model No. : NC-73*

*Serial No. : 10786708*

*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C113972.*

*The equipment is supplied by*

*Co. Name : Envirotech Services Co.*

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,  
Hong Kong*

*Date of Issue : 18 July 2011*

*Certified by :*

*HC Chan*

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
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Calibration and Testing Laboratory of Sun Creation Engineering Limited

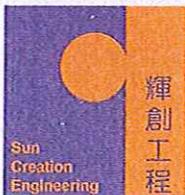
e/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C113972

## Calibration Report

### ITEM TESTED

DESCRIPTION : Sound Level Calibrator  
MANUFACTURER : Rion  
MODEL NO. : NC-73  
SERIAL NO. : 10786708

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^{\circ}\text{C}$  RELATIVE HUMIDITY :  $(55 \pm 20)\%$   
LINE VOLTAGE : ---

### TEST SPECIFICATIONS

Calibration check

DATE OF TEST : 16 July 2011

JOB NO. : IC11-1746

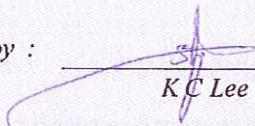
### TEST RESULTS

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

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

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

Tested by :

  
K C Lee

Date : 18 July 2011

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
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Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com

Page 1 of 2



# Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours before the commencement of the test.
2. The results presented are the mean of 3 measurements at each calibration point.
3. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
TST150A	Measuring Amplifier	C101008
CL130	Universal Counter	C113350
CL281	Multifunction Acoustic Calibrator	C1006860

4. Test procedure : MA100N.

5. Results :

- 5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	93.9	± 0.5	± 0.2

- 5.2 Frequency Accuracy

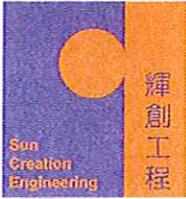
UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.991	1 kHz ± 2 %	± 1

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

Note :

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

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C113870

## Certificate of Calibration

*This is to certify that the equipment*

*Description : Sound Level Calibrator*

*Manufacturer : Rion*

*Model No. : NC-73*

*Serial No. : 10997142*

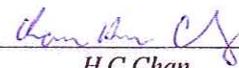
*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C113870.*

*The equipment is supplied by*

*Co. Name : Envirotech Services Co.*

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,  
Hong Kong*

*Date of Issue : 11 July 2011*

*Certified by :   
H C Chan*

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

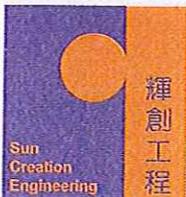
c/o 4 E. Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

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Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C113870

## Calibration Report

### ITEM TESTED

DESCRIPTION : Sound Level Calibrator  
MANUFACTURER : Rion  
MODEL NO. : NC-73  
SERIAL NO. : 10997142

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^{\circ}\text{C}$  RELATIVE HUMIDITY :  $(55 \pm 20)\%$   
LINE VOLTAGE : ---

### TEST SPECIFICATIONS

Calibration

DATE OF TEST : 11 July 2011

JOB NO. : IC11-1713

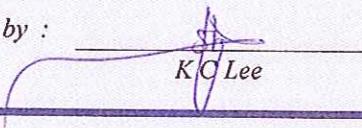
### TEST RESULTS

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

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

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

Tested by :

  
K C Lee

Date : 11 July 2011

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
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Calibration and Testing Laboratory of Sun Creation Engineering Limited

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Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com

Page 1 of 3

## Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours before the commencement of the test.
2. The results presented are the mean of 3 measurements at each calibration point.
3. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
TST150A	Measuring Amplifier	C101008
CL130	Universal Counter	C113350
CL281	Multifunction Acoustic Calibrator	C1006860

4. Test procedure : MA100N.

5. Results :

### 5.1 Sound Level Accuracy

#### 5.1.1 Before Adjustment

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.3	± 0.5	± 0.2

#### 5.1.2 After Adjustment

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.5	± 0.2

### 5.2 Frequency Accuracy

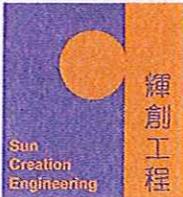
#### 5.2.1 Before Adjustment

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.991	1 kHz ± 2 %	± 1

#### 5.2.2 After Adjustment

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.991	1 kHz ± 2 %	± 1

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C113870

## *Calibration Report*

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

Note :

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

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
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E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C113973

## *Certificate of Calibration*

*This is to certify that the equipment*

*Description : Sound Level Meter*

*Manufacturer : Rion*

*Model No. : NL-31*

*Serial No. : 00320533*

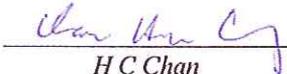
*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C113973.*

*The equipment is supplied by*

*Co. Name : Envirotech Services Co.*

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,  
Hong Kong*

*Date of Issue : 18 July 2011*

*Certified by :*   
H C Chan

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

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

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E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C113973

## Calibration Report

### ITEM TESTED

DESCRIPTION : Sound Level Meter  
MANUFACTURER : Rion  
MODEL NO. : NL-31  
SERIAL NO. : 00320533

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^{\circ}\text{C}$   
LINE VOLTAGE : ---

RELATIVE HUMIDITY :  $(55 \pm 20)\%$

### TEST SPECIFICATIONS

Calibration check

DATE OF TEST : 16 July 2011

JOB NO. : IC11-1746

### TEST RESULTS

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

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

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

Tested by :

  
K C Lee

Date : 18 July 2011

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

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E-mail: callab@suncreation.com

Website: www.suncreation.com

Page 1 of 4

## Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C110018
CL281	Multifunction Acoustic Calibrator	C1006860

5. Test procedure : MA101N.

6. Results :

### 6.1 Sound Pressure Level

#### 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9	± 0.7

#### 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9 (Ref.)
				104.00		103.9
				114.00		113.9

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9	Ref.
			Slow			93.8	± 0.1

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.

## Calibration Report

### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
20 - 110	L <sub>A</sub>	A	FAST	106.00	Continuous	106.0	Ref.
	L <sub>AMAX</sub>				200 ms	105.1	-1.0 ± 1.0
	L <sub>A</sub>	SLOW	Continuous		106.0	Ref.	
	L <sub>AMAX</sub>		500 ms		102.0	-4.1 ± 1.0	

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>A</sub>	A	Fast	94.00	31.5 Hz	54.2	-39.4 ± 1.5
					63 Hz	67.6	-26.2 ± 1.5
					125 Hz	77.7	-16.1 ± 1.0
					250 Hz	85.2	-8.6 ± 1.0
					500 Hz	90.6	-3.2 ± 1.0
					1 kHz	93.9	Ref.
					2 kHz	95.1	+1.2 ± 1.0
					4 kHz	95.0	+1.0 ± 1.0
					8 kHz	92.8	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.9	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>C</sub>	C	Fast	94.00	31.5 Hz	90.7	-3.0 ± 1.5
					63 Hz	92.9	-0.8 ± 1.5
					125 Hz	93.6	-0.2 ± 1.0
					250 Hz	93.8	0.0 ± 1.0
					500 Hz	93.9	0.0 ± 1.0
					1 kHz	93.9	Ref.
					2 kHz	93.8	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	90.9	-3.0 (+1.5 ; -3.0)
					12.5 kHz	88.1	-6.2 (+3.0 ; -6.0)

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.

## Calibration Report

### 6.4 Time Averaging

UUT Setting				Applied Value					UUT	IEC 60804
Range (dB)	Mode	Frequency Weighting	Time Weighting	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type 1 Spec. (dB)
20 - 110	L <sub>Aeq</sub>	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
			60 sec.					90	90.0	± 0.5
			5 min.					80	80.0	± 1.0
								70	70.0	± 1.0

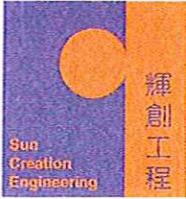
Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5 Hz - 125 Hz : ± 0.35 dB  
 250 Hz - 500 Hz : ± 0.30 dB  
 1 kHz : ± 0.20 dB  
 2 kHz - 4 kHz : ± 0.35 dB  
 8 kHz : ± 0.45 dB  
 12.5 kHz : ± 0.70 dB  
 104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

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

**Note :**

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



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C113827

## Certificate of Calibration

*This is to certify that the equipment*

*Description : Sound Level Meter*

*Manufacturer : Rion*

*Model No. : NL-31*

*Serial No. : 00603867*

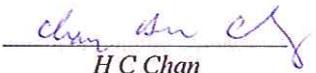
*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C113827.*

*The equipment is supplied by*

*Co. Name : Envirotech Services Co.*

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,  
Hong Kong*

*Date of Issue : 8 July 2011*

Certified by :   
H C Chan

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C113827

## Calibration Report

### ITEM TESTED

DESCRIPTION : Sound Level Meter  
MANUFACTURER : Rion  
MODEL NO. : NL-31  
SERIAL NO. : 00603867

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^{\circ}\text{C}$   
LINE VOLTAGE : ---

RELATIVE HUMIDITY :  $(55 \pm 20)\%$

### TEST SPECIFICATIONS

Calibration check

DATE OF TEST : 7 July 2011

JOB NO. : IC11-1657

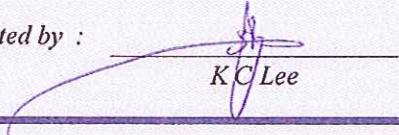
### TEST RESULTS

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

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

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

Tested by :

  
KC Lee

Date : 8 July 2011

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

Tel: 2927 2606

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E-mail: callab@suncreation.com

Website: www.suncreation.com

Page 1 of 4

## Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C110018
CL281	Multifunction Acoustic Calibrator	C1006860

5. Test procedure : MA101N.

6. Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	94.0	± 1.1

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		113.9

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

- 6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	94.0	Ref.
			Slow				

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
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## Calibration Report

### 6.3 Frequency Weighting

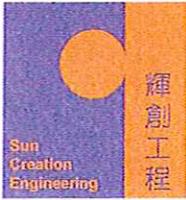
#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>A</sub>	A	Fast	94.00	63 Hz	67.7	-26.2 ± 1.5
					125 Hz	77.7	-16.1 ± 1.5
					250 Hz	85.3	-8.6 ± 1.4
					500 Hz	90.7	-3.2 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	95.3	+1.2 ± 1.6
					4 kHz	95.1	+1.0 ± 1.6
					8 kHz	93.0	-1.1 (+2.1 ; -3.1)
					12.5 kHz	90.1	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>C</sub>	C	Fast	94.00	63 Hz	93.1	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.0	0.0 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	93.9	-0.2 ± 1.6
					4 kHz	93.3	-0.8 ± 1.6
					8 kHz	91.1	-3.0 (+2.1 ; -3.1)
					12.5 kHz	88.2	-6.2 (+3.0 ; -6.0)

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.



## Calibration Report

Remarks : - Mfr's Spec. : IEC 61672 Class 1

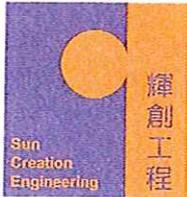
- Uncertainties of Applied Value : 94 dB : 63 Hz - 125 Hz :  $\pm 0.35$  dB  
250 Hz - 500 Hz :  $\pm 0.30$  dB  
1 kHz :  $\pm 0.20$  dB  
2 kHz - 4 kHz :  $\pm 0.35$  dB  
8 kHz :  $\pm 0.45$  dB  
12.5 kHz :  $\pm 0.70$  dB  
104 dB : 1 kHz :  $\pm 0.10$  dB (Ref. 94 dB)  
114 dB : 1 kHz :  $\pm 0.10$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

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

Note :

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

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C113270

## Certificate of Calibration

*This is to certify that the equipment*

*Description : Sound Level Meter*

*Manufacturer : Rion*

*Model No. : NL-31*

*Serial No. : 00410224*

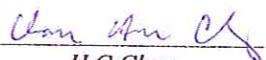
*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C113270.*

*The equipment is supplied by*

*Co. Name : Envirotech Services Co.*

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,  
Hong Kong*

*Date of Issue : 10 June 2011*

*Certified by :   
H C Chan*

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

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Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C113270

## Calibration Report

### ITEM TESTED

DESCRIPTION : Sound Level Meter  
MANUFACTURER : Rion  
MODEL NO. : NL-31  
SERIAL NO. : 00410224

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^\circ\text{C}$  RELATIVE HUMIDITY :  $(55 \pm 20)\%$   
LINE VOLTAGE : ---

### TEST SPECIFICATIONS

Calibration check

DATE OF TEST : 10 June 2011

JOB NO. : IC11-1416

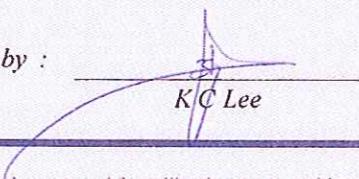
### TEST RESULTS

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

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

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

Tested by :

  
K/C Lee

Date : 10 June 2011

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

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Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com

Page 1 of 4

## Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C110018
CL281	Multifunction Acoustic Calibrator	C1006860

5. Test procedure : MA101N.

6. Results :

### 6.1 Sound Pressure Level

#### 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9	± 0.7

#### 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9 (Ref.)
				104.00		103.9
				114.00		113.9

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9	Ref.
			Slow			93.9	± 0.1

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.

## Calibration Report

### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
20 - 110	L <sub>A</sub>	A	FAST	106.00	Continuous	106.0	Ref.
	L <sub>AMAX</sub>				200 ms	105.1	-1.0 ± 1.0
	L <sub>A</sub>	SLOW	Continuous		106.0	Ref.	
	L <sub>AMAX</sub>		500 ms		102.0	-4.1 ± 1.0	

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>A</sub>	A	Fast	94.00	31.5 Hz	54.2	-39.4 ± 1.5
					63 Hz	67.6	-26.2 ± 1.5
					125 Hz	77.7	-16.1 ± 1.0
					250 Hz	85.2	-8.6 ± 1.0
					500 Hz	90.7	-3.2 ± 1.0
					1 kHz	93.9	Ref.
					2 kHz	95.2	+1.2 ± 1.0
					4 kHz	95.0	+1.0 ± 1.0
					8 kHz	92.9	-1.1 (+1.5 ; -3.0)
					12.5 kHz	90.0	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>C</sub>	C	Fast	94.00	31.5 Hz	90.7	-3.0 ± 1.5
					63 Hz	93.0	-0.8 ± 1.5
					125 Hz	93.7	-0.2 ± 1.0
					250 Hz	93.9	0.0 ± 1.0
					500 Hz	93.9	0.0 ± 1.0
					1 kHz	93.9	Ref.
					2 kHz	93.8	-0.2 ± 1.0
					4 kHz	93.3	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	88.1	-6.2 (+3.0 ; -6.0)

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.

## Calibration Report

### 6.4 Time Averaging

UUT Setting				Applied Value					UUT	IEC 60804
Range (dB)	Mode	Frequency Weighting	Time Weighting	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type 1 Spec. (dB)
20 - 110	L <sub>Aeq</sub>	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
			60 sec.					90	90.0	± 0.5
			60 sec.					80	80.0	± 1.0
			5 min.					70	70.0	± 1.0

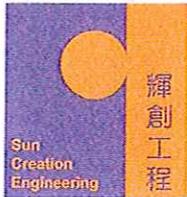
Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5 Hz - 125 Hz : ± 0.35 dB  
 250 Hz - 500 Hz : ± 0.30 dB  
 1 kHz : ± 0.20 dB  
 2 kHz - 4 kHz : ± 0.35 dB  
 8 kHz : ± 0.45 dB  
 12.5 kHz : ± 0.70 dB  
 104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

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

Note :

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



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C113112

## Certificate of Calibration

*This is to certify that the equipment*

*Description : Precision Integrating Sound Level Meter*

*Manufacturer : Rion*

*Model No. : NL-18*

*Serial No. : 00360030*

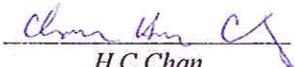
*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C113112.*

*The equipment is supplied by*

*Co. Name : Envirotech Services Co.*

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,  
Hong Kong*

*Date of Issue : 2 June 2011*

*Certified by :*   
H C Chan

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

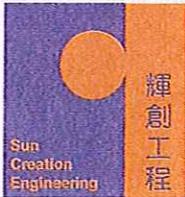
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C113112

## Calibration Report

### ITEM TESTED

DESCRIPTION : Precision Integrating Sound Level Meter  
MANUFACTURER : Rion  
MODEL NO. : NL-18  
SERIAL NO. : 00360030

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^{\circ}\text{C}$  RELATIVE HUMIDITY :  $(55 \pm 20)\%$   
LINE VOLTAGE : ---

### TEST SPECIFICATIONS

Calibration

DATE OF TEST : 1 June 2011

JOB NO. : IC11-1337

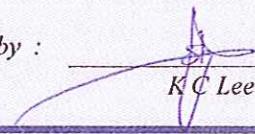
### TEST RESULTS

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

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

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

Tested by :

  
K C Lee

Date : 2 June 2011

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com

Page 1 of 4

## Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration using the internal standard (After Adjustment) was performed before the test 6.1.1.2 - 6.4.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C110018
CL281	Multifunction Acoustic Calibrator	C1006860

5. Test procedure : MA101N.

6. Results :

### 6.1 Sound Pressure Level

#### 6.1.1 Reference Sound Pressure Level

##### 6.1.1.1 Before Adjustment

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	94.5	± 0.7

##### 6.1.1.2 After Adjustment

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	94.0	± 0.7

##### 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
60 - 120	LA	A	Fast	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.0

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

## Calibration Report

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	A	Fast	94.00	1	94.0	Ref.
			Slow			94.0	$\pm 0.1$

#### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
50 - 110	LA	A	Fast	106.00	Continuous	106.0	Ref.
	LAmx				200 ms	105.1	$-1.0 \pm 1.0$
	LA		Slow		Continuous	106.0	Ref.
	LAmx				500 ms	102.5	$-4.1 \pm 1.0$

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LA	A	Fast	94.00	31.5 Hz	54.4	$-39.4 \pm 1.5$
					63 Hz	67.7	$-26.2 \pm 1.5$
					125 Hz	77.7	$-16.1 \pm 1.0$
					250 Hz	85.2	$-8.6 \pm 1.0$
					500 Hz	90.7	$-3.2 \pm 1.0$
					1 kHz	94.0	Ref.
					2 kHz	95.3	$+1.2 \pm 1.0$
					4 kHz	95.1	$+1.0 \pm 1.0$
					8 kHz	92.9	$-1.1 (+1.5 ; -3.0)$
					12.5 kHz	89.7	$-4.3 (+3.0 ; -6.0)$

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

## Calibration Report

### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LC	C	Fast	94.00	31.5 Hz	90.9	-3.0 ± 1.5
					63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.1	0.0 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.7	-6.2 (+3.0 ; -6.0)

### 6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Integrating Time	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
50 - 110	LAeq	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
								90	90.0	± 0.5
			60 sec.					80	79.6	± 1.0
			5 min.					70	69.7	± 1.0

Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

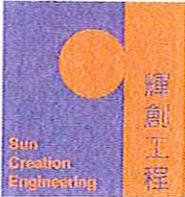
- Uncertainties of Applied Value : 94 dB : 31.5 Hz - 125 Hz : ± 0.35 dB  
 250 Hz - 500 Hz : ± 0.30 dB  
 1 kHz : ± 0.20 dB  
 2 kHz - 4 kHz : ± 0.35 dB  
 8 kHz : ± 0.45 dB  
 104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

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

**Note :**

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

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C114103

## Certificate of Calibration

*This is to certify that the equipment*

*Description : Precision Sound Level Meter*

*Manufacturer : Rion*

*Model No. : NA-27*

*Serial No. : 00201194*

*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C114103.*

*The equipment is supplied by*

*Co. Name : Envirotech Services Co.*

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,  
Hong Kong*

*Date of Issue : 26 July 2011*

*Certified by :*

*K C Lee*

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

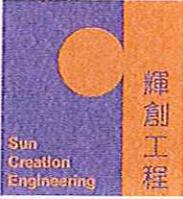
c/o J.F. Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C114103

## Calibration Report

### ITEM TESTED

DESCRIPTION : Precision Sound Level Meter  
MANUFACTURER : Rion  
MODEL NO. : NA-27  
SERIAL NO. : 00201194

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^\circ\text{C}$  RELATIVE HUMIDITY :  $(55 \pm 20)\%$   
LINE VOLTAGE : ---

### TEST SPECIFICATIONS

Calibration check

DATE OF TEST : 22 July 2011

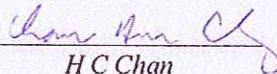
JOB NO. : IC11-1826

### TEST RESULTS

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

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

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

Tested by :   
H C Chan

Date : 26 July 2011

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com

Page 1 of 4

## Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurement at each calibration point.
4. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C110018
CL281	Multifunction Acoustic Calibrator	C1006860

5. Test procedure : MA101N.

6. Results :

### 6.1 Sound Pressure Level

#### 6.1.1 Reference Sound Pressure Level

##### 6.1.1.1 Before Self-Calibration

UUT Setting			Applied Value		UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 110	LA	Fast	94.00	1	94.1

##### 6.1.1.2 After Self-Calibration

UUT Setting			Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	Fast	94.00	1	94.0	± 0.7

##### 6.1.2 Linearity

UUT Setting			Applied Value		UUT Reading (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
60 - 120	LA	Fast	94.00	1	94.0 (Ref.)
			104.00		104.0
			114.00		114.0

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

## Calibration Report

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting			Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 110	LA	Fast	94.00	1	94.0	Ref.
		Slow			94.0	$\pm 0.1$

#### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting			Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
50 - 110	LA	Fast	106.00	Continuous	106.0	Ref.
	LAmx			200 ms	105.0	$-1.0 \pm 1.0$
	LA	Slow		Continuous	106.0	Ref.
	LAmx			500 ms	102.0	$-4.1 \pm 1.0$

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting			Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LA	Fast	94.00	31.5 Hz	54.4	$-39.4 \pm 1.5$
				63 Hz	67.8	$-26.2 \pm 1.5$
				125 Hz	77.8	$-16.1 \pm 1.0$
				250 Hz	85.3	$-8.6 \pm 1.0$
				500 Hz	90.7	$-3.2 \pm 1.0$
				1 kHz	94.0	Ref.
				2 kHz	95.2	$+1.2 \pm 1.0$
				4 kHz	95.0	$+1.0 \pm 1.0$
				8 kHz	92.9	$-1.1 (+1.5 ; -3.0)$
				12.5 kHz	89.7	$-4.3 (+3.0 ; -6.0)$

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

## Calibration Report

### 6.3.2 C-Weighting

UUT Setting			Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 110	LC	Fast	94.00	31.5 Hz	91.0	-3.0 ± 1.5
				63 Hz	93.1	-0.8 ± 1.5
				125 Hz	93.8	-0.2 ± 1.0
				250 Hz	94.0	0.0 ± 1.0
				500 Hz	94.0	0.0 ± 1.0
				1 kHz	94.0	Ref.
				2 kHz	93.8	-0.2 ± 1.0
				4 kHz	93.2	-0.8 ± 1.0
				8 kHz	90.9	-3.0 (+1.5 ; -3.0)
				12.5 kHz	87.8	-6.2 (+3.0 ; -6.0)

### 6.4 Time Averaging

UUT Setting			Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Mode	Integrating Time	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
50 - 110	LAeq	10 sec.	4	1	1/10	110.0	100	100.1	± 0.5
					1/10 <sup>2</sup>		90	90.1	± 0.5
		60 sec.			1/10 <sup>3</sup>		80	80.0	± 1.0
		5 min.			1/10 <sup>4</sup>		70	70.0	± 1.0

Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5 Hz - 125 Hz : ± 0.35 dB  
 250 Hz - 500 Hz : ± 0.30 dB  
 1 kHz : ± 0.20 dB  
 2 kHz - 4 kHz : ± 0.35 dB  
 8 kHz : ± 0.45 dB  
 12.5 kHz : ± 0.70 dB  
 104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

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

**Note :**

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

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C106297

## *Certificate of Calibration*

*This is to certify that the equipment*

*Description : Integrating Sound Level Meter*

*Manufacturer : Bruel & Kjaer*

*Model No. : 2238*

*Serial No. : 2448529*

*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C106297.*

*The equipment is supplied by*

*Co. Name : Hyder Consulting Limited*

*Address : 47/F., Hopewell Centre, 183 Queen's Road East,  
Wanchai, Hong Kong*

*Date of Issue : 16 November 2010*

*Certified by :*

*K/C Lee*

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C106297

## Calibration Report

### ITEM TESTED

DESCRIPTION : Integrating Sound Level Meter  
MANUFACTURER : Bruel & Kjaer  
MODEL NO. : 2238  
SERIAL NO. : 2448529

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^{\circ}\text{C}$  RELATIVE HUMIDITY :  $(55 \pm 20)\%$   
LINE VOLTAGE : ---

### TEST SPECIFICATIONS

Calibration check

DATE OF TEST : 16 November 2010

JOB NO. : IC10-2916

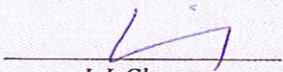
### TEST RESULTS

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

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

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

Tested by :

  
L L Cheung

Date : 16 November 2010

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

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

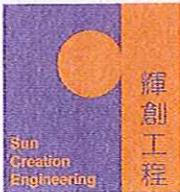
Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com

Page 1 of 4



# Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. The results presented are the mean of 3 measurements at each calibration point.
3. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C100067
CL281	Multifunction Acoustic Calibrator	C1006860

4. Test procedure : MA101N.

5. Results :

5.1 Sound Pressure Level

5.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.0	± 0.7

5.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		114.0

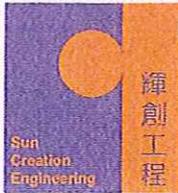
IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

5.2 Time Weighting

5.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.0	Ref.
	L <sub>ASP</sub>		S			94.1	± 0.1
	L <sub>AIP</sub>		I			94.1	± 0.1

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.



## Calibration Report

### 5.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L <sub>AFP</sub>	A	F	106.0	Continuous	106.0	Ref.
	L <sub>AFMax</sub>				200 ms	105.0	-1.0 ± 1.0
	L <sub>ASP</sub>	S	Continuous		106.0	Ref.	
	L <sub>ASMax</sub>		500 ms		101.9	-4.1 ± 1.0	

### 5.3 Frequency Weighting

#### 5.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>AFP</sub>	A	F	94.00	31.5 Hz	54.9	-39.4 ± 1.5
					63 Hz	67.9	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.0
					250 Hz	85.3	-8.6 ± 1.0
					500 Hz	90.7	-3.2 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.0
					4 kHz	95.0	+1.0 ± 1.0
					8 kHz	92.9	-1.1 (-1.5 ; -3.0)
					12.5 kHz	89.9	-4.3 (-3.0 ; -6.0)

#### 5.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>CFP</sub>	C	F	94.00	31.5 Hz	91.3	-3.0 ± 1.5
					63 Hz	93.3	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.0	0.0 ± 1.0
					500 Hz	94.0	0.0 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	93.8	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (-1.5 ; -3.0)
					12.5 kHz	87.9	-6.2 (-3.0 ; -6.0)

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.



# Calibration Report

5.4 Time Averaging

UUT Setting				Applied Value					UUT	IEC 60804
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type 1 Spec. (dB)
30 - 110	L <sub>Aeq</sub>	A	10 sec.	4	1	1/10	110.0	100	99.9	± 0.5
			60 sec.					90	89.7	± 0.5
			5 min.					80	79.9	± 1.0
								70	69.7	± 1.0

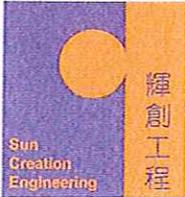
Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :
  - 94 dB : 31.5 Hz - 125 Hz : ± 0.40 dB
  - 250 Hz - 500 Hz : ± 0.30 dB
  - 1 kHz : ± 0.20 dB
  - 2 kHz : ± 0.40 dB
  - 4 kHz : ± 0.50 dB
  - 8 kHz : ± 0.70 dB
  - 12.5 kHz : ± 1.20 dB
  - 104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)
  - 114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)
  - Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)
- The uncertainties are for a confidence probability of not less than 95 %.

Note :

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

The test equipment used for calibration are traceable to the National Standards as specified in this report. This report shall not be reproduced except in full and with prior written approval from this laboratory.



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Certificate No. : C105886

## Certificate of Calibration

*This is to certify that the equipment*

*Description : Sound Level Meter*

*Manufacturer : Rion*

*Model No. : NL-31*

*Serial No. : 00983400*

*has been calibrated for the specific items and ranges.  
The results are shown in the Calibration Report No. C105886.*

*The equipment is supplied by*

*Co. Name : Envirotech Services Co.*

*Address : Shop 6, G/F., Casio Mansion, 209 Shaukeiwan Road,  
Hong Kong*

*Date of Issue : 26 October 2010*

*Certified by :*

*K C Lee*

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

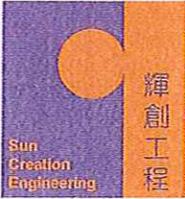
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

Tel: 2927 2606

Fax: 2744 8986

E-mail: callab@suncreation.com

Website: www.suncreation.com



輝創工程有限公司

Sun Creation Engineering Limited Calibration and Testing Laboratory

Report No. : C105886

## Calibration Report

### ITEM TESTED

DESCRIPTION : Sound Level Meter  
MANUFACTURER : Rion  
MODEL NO. : NL-31  
SERIAL NO. : 00983400

### TEST CONDITIONS

AMBIENT TEMPERATURE :  $(23 \pm 2)^{\circ}\text{C}$  RELATIVE HUMIDITY :  $(55 \pm 20)\%$   
LINE VOLTAGE : ---

### TEST SPECIFICATIONS

Calibration check

DATE OF TEST : 25 October 2010

JOB NO. : IC10-2726

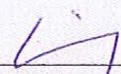
### TEST RESULTS

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

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

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

Tested by :

  
L L Cheung

Date : 26 October 2010

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
This report shall not be reproduced except in full and with prior written approval from this laboratory.

Calibration and Testing Laboratory of Sun Creation Engineering Limited

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong  
Tel: 2927 2606 Fax: 2744 8986 E-mail: callab@suncreation.com Website: www.suncreation.com

Page 1 of 4

## Calibration Report

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 24 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C100067
CL281	Multifunction Acoustic Calibrator	C1006860

5. Test procedure : MA101N.

6. Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	94.0	± 1.1

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		114.1

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

- 6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	94.0	Ref.
			Slow			93.9	± 0.3

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## Calibration Report

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>A</sub>	A	Fast	94.00	63 Hz	67.6	-26.2 ± 1.5
					125 Hz	77.7	-16.1 ± 1.5
					250 Hz	85.2	-8.6 ± 1.4
					500 Hz	90.7	-3.2 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	95.3	+1.2 ± 1.6
					4 kHz	95.1	+1.0 ± 1.6
					8 kHz	93.0	-1.1 (+2.1 ; -3.1)
					12.5 kHz	90.1	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>C</sub>	C	Fast	94.00	63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.0	0.0 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	93.9	-0.2 ± 1.6
					4 kHz	93.4	-0.8 ± 1.6
					8 kHz	91.1	-3.0 (+2.1 ; -3.1)
					12.5 kHz	88.3	-6.2 (+3.0 ; -6.0)

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
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## Calibration Report

Remarks : - Mfr's Spec. : IEC 61672 Class 1

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

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

Note :

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

The test equipment used for calibration are traceable to the National Standards as specified in this report.  
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Annex B2

## Results of Noise Monitoring

Annex B2  
Operational Noise Monitoring Results

Monitoring Location: AON1 Open area adjacent to Police Training School

Date	Weekdays/ Public Holiday (WD/PH)	Measurement Period, hours		Measured Noise Level <sup>(1)</sup> , dB(A)			Daily Operational Noise Level (Background Corrected), L <sub>eq,30min</sub>		Lagoon Night Show Noise Level (Background Corrected), L <sub>eq,30min</sub>		Noise Criteria, L <sub>eq,30min</sub> , dB(A)	Remark / Other Noise Source(s)
		Start	End	Daily Operational Noise Level, L <sub>eq, 30min</sub>	Lagoon Night Show Noise Level, L <sub>eq,30min</sub>	Background Noise Level, L <sub>eq,15min</sub>	Without façade		With façade correction			
							Without façade	With façade correction	Without façade	With façade correction		
26-Jun-11	PH	1920	2030	66.3	65.1	65.2	59.6	62.6	Negligible	Negligible	60	Note <sup>(1) &amp; (2)</sup>
30-Jun-11	WD	1920	2030	63.5	64.1	63.1	53.3	56.3	57.3	60.3	60	Note <sup>(1)</sup>
03-Jul-11	PH	2020	2130	63.1	64.9	63.8	Negligible	Negligible	58.6	61.6	60	Note <sup>(1) &amp; (2)</sup>
08-Jul-11	WD	2020	2130	63.0	65.5	65.6	Negligible	Negligible	Negligible	Negligible	60	Note <sup>(1)</sup>
10-Jul-11	PH	2020	2130	64.2	63.6	63.3	56.8	59.8	51.9	54.9	60	Note <sup>(1)</sup>
12-Jul-11	WD	1920	2030	64.1	65.1	64.3	Negligible	Negligible	57.4	60.4	60	Note <sup>(1)</sup>
17-Jul-11	PH	2020	2130	63.9	63.7	63.4	54.2	57.2	52.2	55.2	60	Note <sup>(1)</sup>
19-Jul-11	WD	1920	2030	64.4	65.1	64.4	Negligible	Negligible	56.3	59.3	60	Note <sup>(1)</sup>
24-Jul-11	PH	2020	2130	64.4	64.0	63.4	57.3	60.3	54.7	57.7	60	Note <sup>(1)</sup>

Monitoring Location: AON2 Roof of Old Canteen Building

Date	Weekdays/ Public Holiday (WD/PH)	Measurement Period, hours		Measured Noise Level <sup>(1)</sup> , dB(A)			Daily Operational Noise Level (Background Corrected), L <sub>eq,30min</sub>	Lagoon Night Show Noise Level (Background Corrected), L <sub>eq,30min</sub>	Noise Criteria, L <sub>eq,30min</sub> , dB(A)	Remark / Other Noise Source(s)
		Start	End	Daily Operational Noise Level, L <sub>eq, 30min</sub>	Lagoon Night Show Noise Level, L <sub>eq,30min</sub>	Background Noise Level, L <sub>eq,15min</sub>				
26-Jun-11	PH	1920	2030	59.6	59.7	58.2	53.9	54.3	60	-
30-Jun-11	WD	1920	2030	58.4	58.1	55.7	55.0	54.3	60	-
03-Jul-11	PH	2020	2130	60.1	58.2	58.4	55.0	Negligible	60	-
08-Jul-11	WD	2020	2130	58.8	59.5	57.3	53.3	55.5	60	-
10-Jul-11	PH	2020	2130	58.4	60.2	58.2	44.1	55.7	60	-
12-Jul-11	WD	1920	2030	60.5	60.7	59.2	54.5	55.3	60	-
17-Jul-11	PH	2020	2130	58.8	60.5	58.9	Negligible	55.5	60	-
19-Jul-11	WD	1920	2030	59.5	60.1	58.9	51.1	53.9	60	-
24-Jul-11	PH	2020	2130	59.1	60.4	59.1	38.0	54.7	60	-

Monitoring Location: AON3 Woodgreen Estate

Date	Weekdays/ Public Holiday (WD/PH)	Measurement Period, hours		Measured Noise Level <sup>(1)</sup> , dB(A)			Daily Operational Noise Level (Background Corrected), L <sub>eq,30min</sub>	Lagoon Night Show Noise Level (Background Corrected), L <sub>eq,30min</sub>	Noise Criteria, L <sub>eq,30min</sub> , dB(A)	Remark / Other Noise Source(s)
		Start	End	Daily Operational Noise Level, L <sub>eq, 30min</sub>	Lagoon Night Show Noise Level, L <sub>eq,30min</sub>	Background Noise Level, L <sub>eq,15min</sub>				
26-Jun-11	PH	1920	2030	62.7	61.9	62.5	48.8	Negligible	55	Note <sup>(1)</sup>
30-Jun-11	WD	1920	2030	64.3	63.4	63.4	56.9	45.3	55	Note <sup>(1) &amp; (3)</sup>
03-Jul-11	PH	2020	2130	62.4	61.9	61.8	53.6	43.7	55	Note <sup>(1)</sup>
08-Jul-11	WD	2020	2130	65.2	63.4	64.1	58.7	Negligible	55	Note <sup>(1) &amp; (3)</sup>
10-Jul-11	PH	2020	2130	64.6	63.7	64.4	50.4	Negligible	55	Note <sup>(1)</sup>
12-Jul-11	WD	1920	2030	66.5	65.2	64.1	62.9	58.8	55	Note <sup>(1) &amp; (3)</sup>
17-Jul-11	PH	2020	2130	60.9	61.6	61.5	Negligible	44.4	55	Note <sup>(1)</sup>
19-Jul-11	WD	1920	2030	64.6	65.3	64.5	48.9	57.5	55	Note <sup>(1) &amp; (3)</sup>
24-Jul-11	PH	2020	2130	60.3	64.7	64.4	Negligible	53.6	55	Note <sup>(1)</sup>

Monitoring Location: AON4 Manly Villa

Date	Weekdays/ Public Holiday (WD/PH)	Measurement Period, hours		Measured Noise Level <sup>[1]</sup> , dB(A)			Daily Operational Noise Level (Background Corrected), $L_{eq, 30min}$	Lagoon Night Show Noise Level (Background Corrected), $L_{eq, 30min}$	Noise Criteria, $L_{eq(30min)}$ , dB(A)	Remark / Other Noise Source(s)
		Start	End	Daily Operational Noise Level, $L_{eq}$ 30min	Lagoon Night Show Noise Level, $L_{eq, 30min}$	Background Noise Level, $L_{eq, 15min}$				
26-Jun-11	PH	1920	2030	55.6	64.5	64.5	Negligible	Negligible	55	Note <sup>[1]</sup>
30-Jun-11	WD	1920	2030	54.1	56.5	53.8	41.8	53.0	55	-
03-Jul-11	PH	2020	2130	55.0	54.9	54.6	44.2	43.8	55	-
08-Jul-11	WD	2020	2130	56.5	55.2	54.4	52.4	47.3	55	-
10-Jul-11	PH	2020	2130	54.9	55.0	54.2	46.7	46.9	55	-
12-Jul-11	WD	1920	2030	56.4	56.4	54.5	51.8	51.9	55	-
17-Jul-11	PH	2020	2130	54.8	55.1	54.4	43.2	46.7	55	-
19-Jul-11	WD	1920	2030	55.0	55.6	55.0	Negligible	46.5	55	-
24-Jul-11	PH	2020	2130	54.5	54.7	53.8	46.3	47.7	55	-

Monitoring Location: AON5 Hau Yuen

Date	Weekdays/ Public Holiday (WD/PH)	Measurement Period, hours		Measured Noise Level <sup>[1]</sup> , dB(A)			Daily Operational Noise Level (Background Corrected), $L_{eq, 30min}$	Lagoon Night Show Noise Level (Background Corrected), $L_{eq, 30min}$	Noise Criteria, $L_{eq(30min)}$ , dB(A)	Remark / Other Noise Source(s)
		Start	End	Daily Operational Noise Level, $L_{eq}$ 30min	Lagoon Night Show Noise Level, $L_{eq, 30min}$	Background Noise Level, $L_{eq, 15min}$				
26-Jun-11	PH	1920	2030	59.1	55.9	57.2	54.7	Negligible	55	Note <sup>[1]</sup>
30-Jun-11	WD	1920	2030	58.1	57.7	58.2	Negligible	Negligible	55	Note <sup>[1]</sup>
03-Jul-11	PH	2020	2130	55.5	55.7	55.5	Negligible	42.2	55	Note <sup>[1]</sup>
08-Jul-11	WD	2020	2130	56.0	55.8	55.3	47.8	46.7	55	-
10-Jul-11	PH	2020	2130	55.7	55.0	54.8	48.6	41.5	55	-
12-Jul-11	WD	1920	2030	56.5	56.9	56.7	Negligible	44.1	55	Note <sup>[1]</sup>
17-Jul-11	PH	2020	2130	55.0	55.6	55.7	Negligible	Negligible	55	Note <sup>[1]</sup>
19-Jul-11	WD	1920	2030	57.9	56.1	56.1	53.2	35.0	55	Note <sup>[1]</sup>
24-Jul-11	PH	2020	2130	54.5	58.3	57.7	Negligible	49.6	55	Note <sup>[1]</sup>

**Notes:**

[1] Bolded value indicates exceedance over the noise criteria.

Negligible refers to the measured impact noise levels lower than the background noise levels.

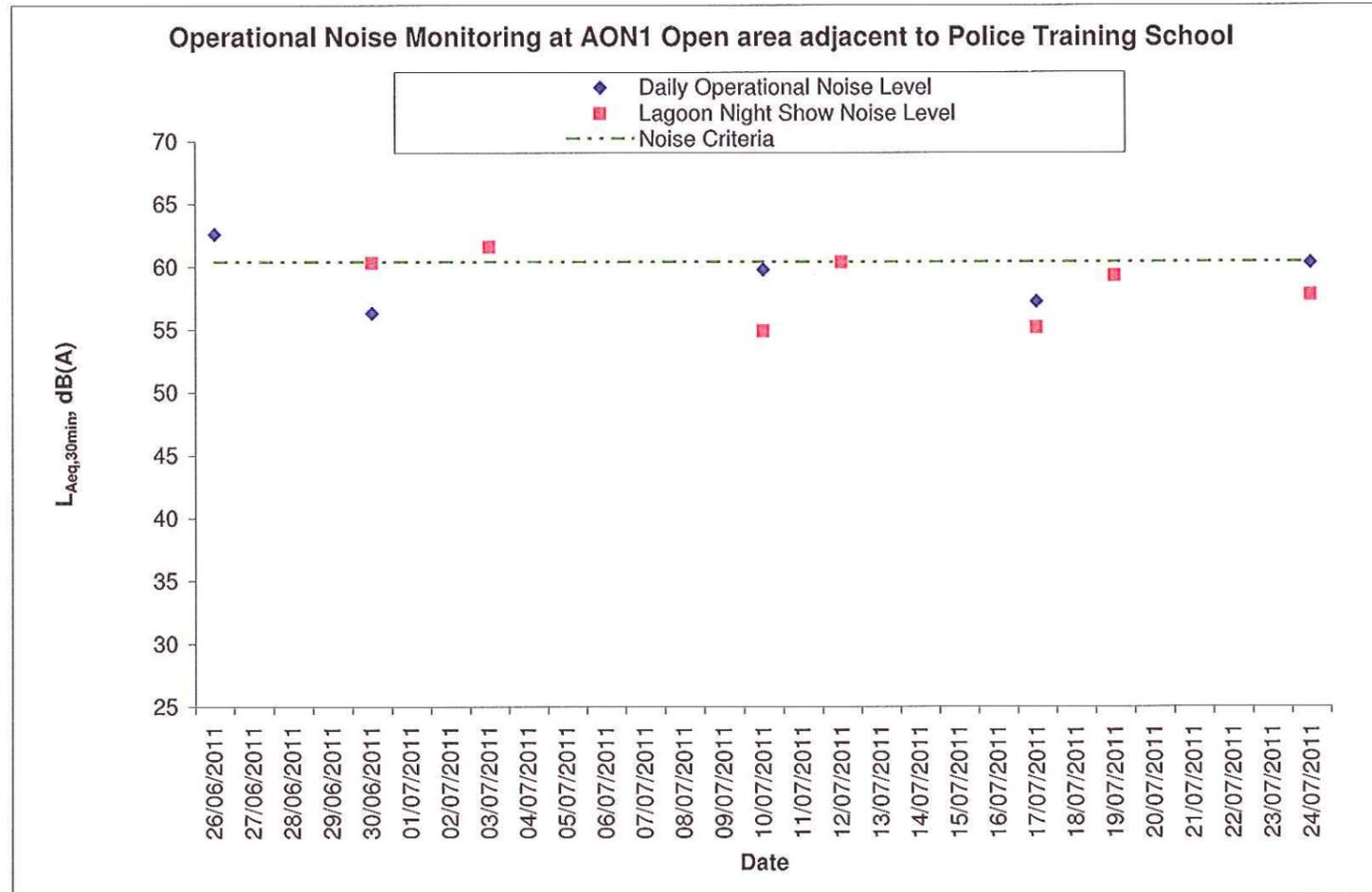
[2] The exceedances were due to the high level of background noise from visitors and traffic on public holidays, especially on 26 June and 3 July 2011, which were public holidays.

[3] The exceedances at AON3 was due to traffic noise from Shouson Hill Road.

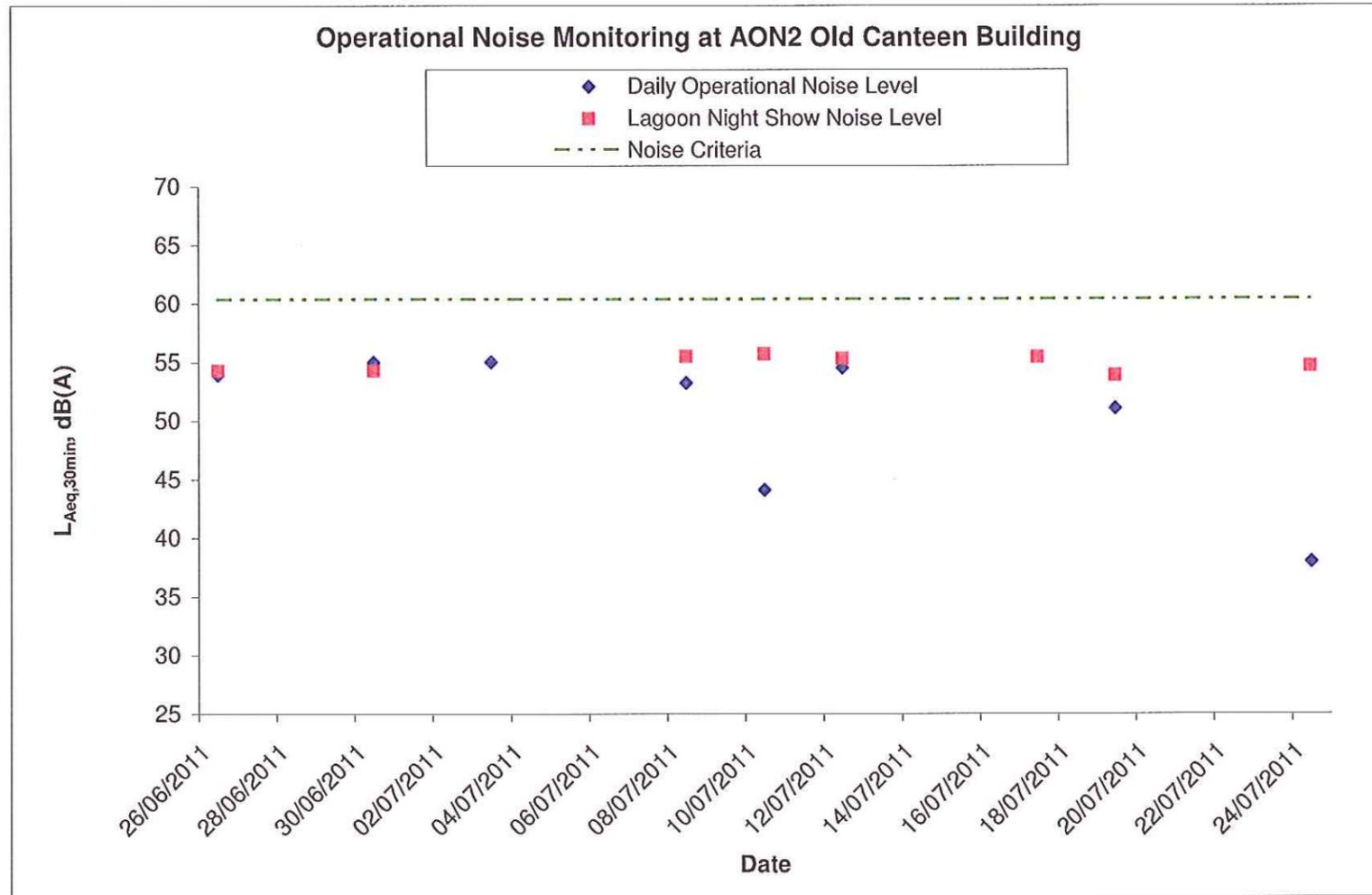
Annex B3

## Graphical Presentation of Noise Monitoring Result

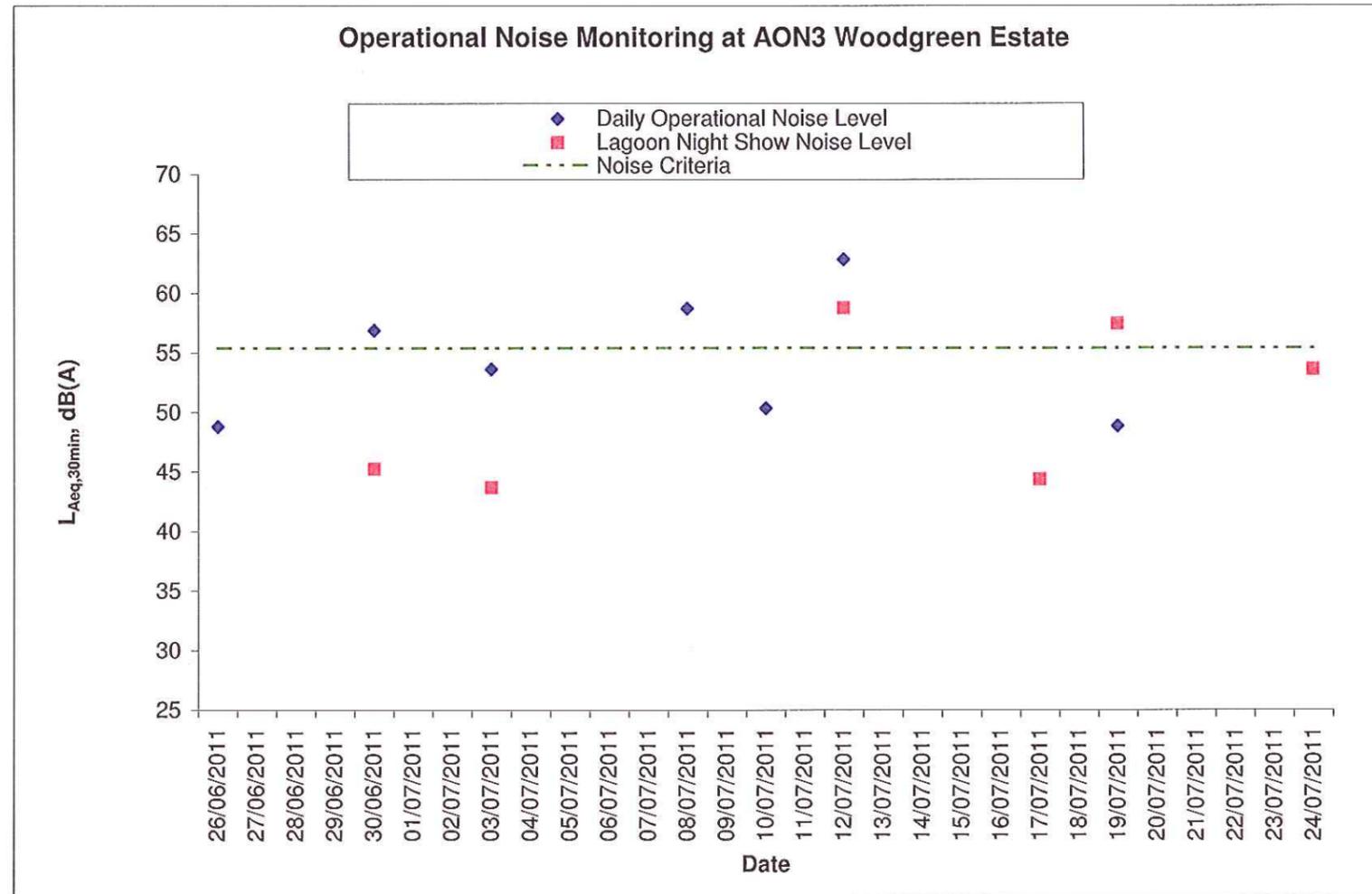
Annex B3-1



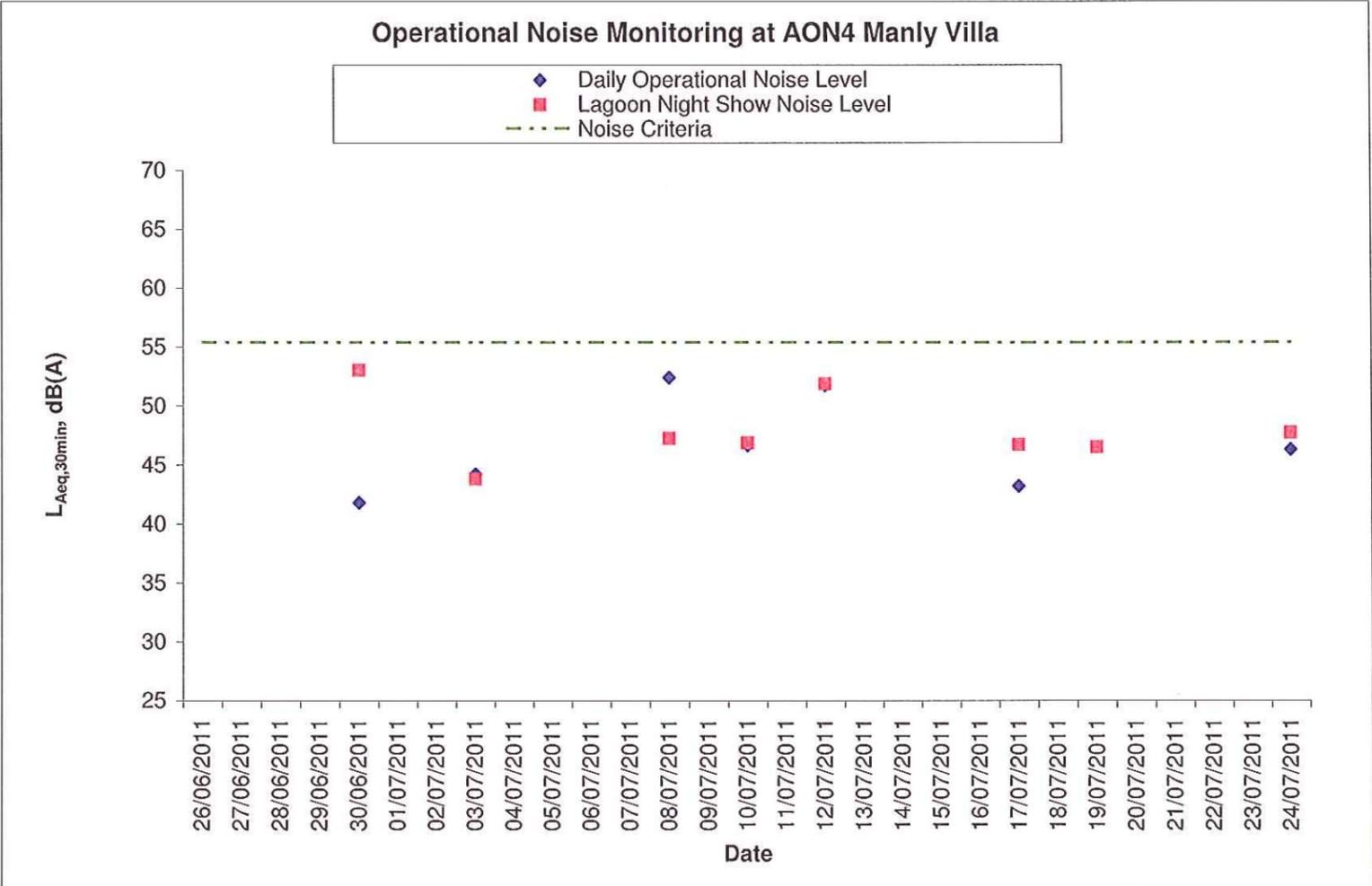
**Note:** The exceedances were due to the high level of background noise from visitors and traffic on public holidays, especially on 26 June and 3 July 2011, which were public holidays.

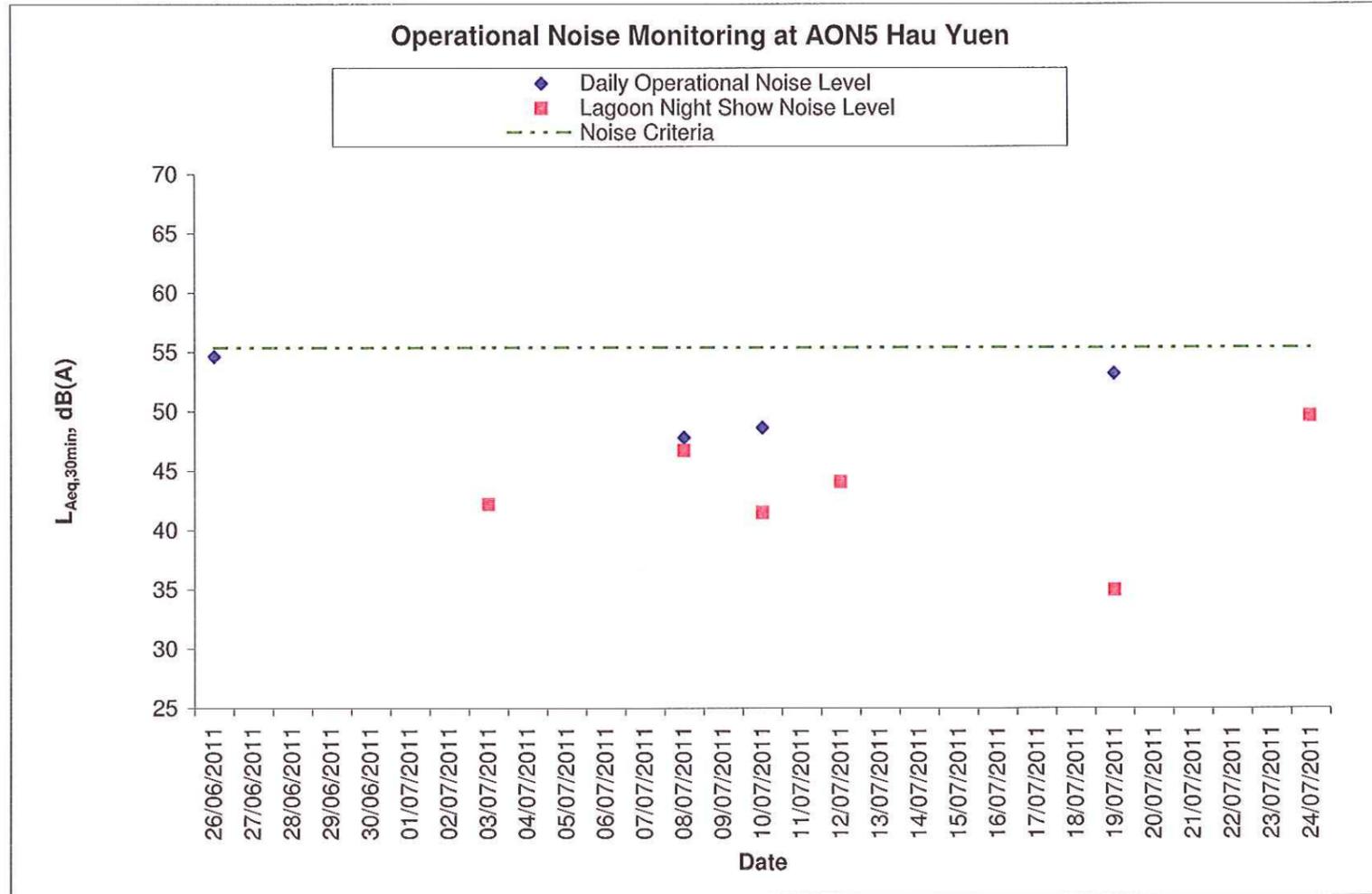


Annex B3-3



**Note:** The exceedances were due to the traffic noise from Shouson Hill Road





**Part 4    7th Coral Monitoring Survey**



Lam Environmental Services Limited

Ocean Park Corporation Master  
Redevelopment Project  
Contract No. CS-03  
Thrill Mountain and Polar Adventure

**OCEAN PARK CORPORATION MASTER  
REDEVELOPMENT PROJECT**

**CONTRACT NO. CS-03**

**THRILL MOUNTAIN AND POLAR ADVENTURE**

**CORAL IMPACT MONITORING**

**AUGUST 2011**

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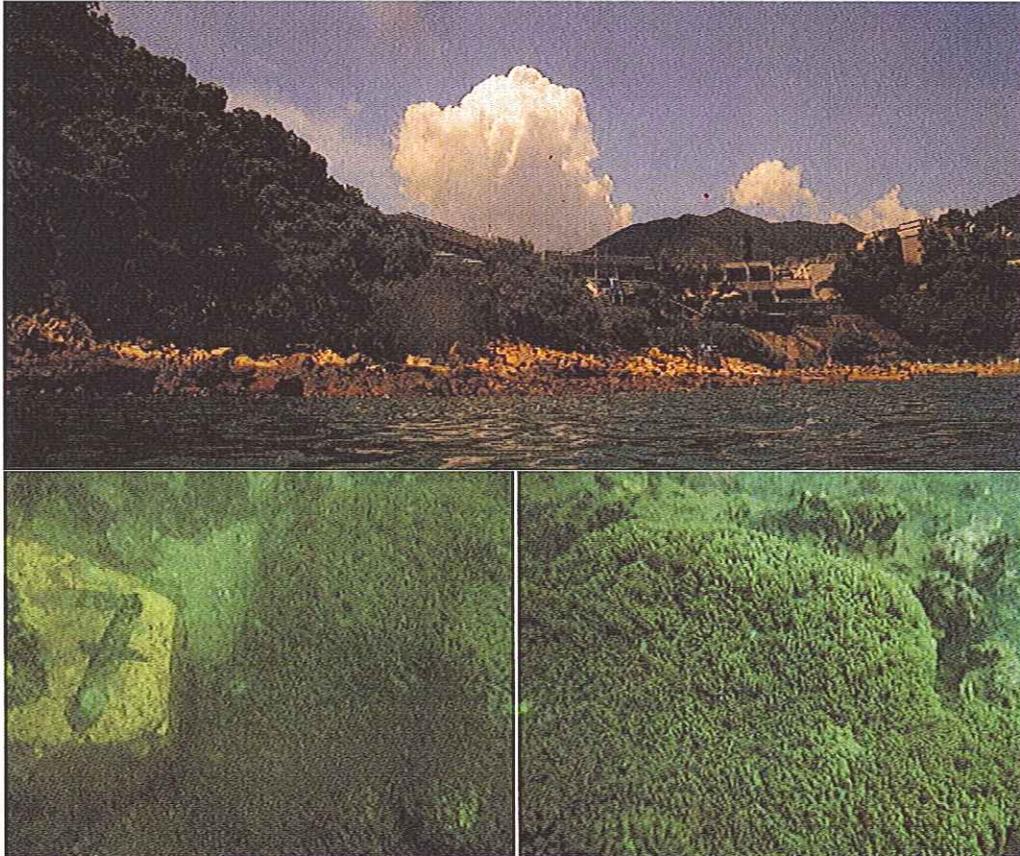
31 August 2011



Lam Environmental Services Limited

Ocean Park Corporation Master  
Redevelopment Project  
Contract No. CS-03  
Thrill Mountain and Polar Adventure

**Ocean Park Corporation Master Redevelopment Project**  
**Contract No. CS-03**  
**Thrill Mountain and Polar Adventure**



**Report for**  
**Coral Monitoring Survey**

**August 2011**



**miniprojects co. Ltd.**



## Contents

1	INTRODUCTION .....	2
1.1	Project Background .....	2
2	METHODOLOGY .....	3
2.1	Monitoring Surveys – Locations.....	3
2.2	Monitoring Requirements.....	3
2.3	Compliance / Event Action Plan .....	5
3	RESULTS .....	
3.1	Sites 1 to 5 and Control Site C – Coral Monitoring Survey Date: 28 May 2011	16
4	SUMMARY AND CONCLUSION .....	11
4.1	Summary .....	11
4.2	Compliance / Event Action Plan .....	11
	APPENDIX I .....	12
	Photographs of the Tagged Corals at Sites 1 to 5 .....	12

### Appendix

- Appendix Ia Photographs of the Re-tagged Corals at Site 1
- Appendix Ib Photographs of the Re-tagged Corals at Site 2
- Appendix Ic Photographs of the Re-tagged Corals at Site 3
- Appendix Id Photographs of the Re-tagged Corals at Site 4
- Appendix Ie Photographs of the Re-tagged Corals at Site 5
- Appendix If Photographs of the Re-tagged Corals at Control Site C

### List of Figures

- 2.1 Map Showing the Locations of the Five Impact Monitoring Sites (1 to 5) and One Control Site (C).

### List of Tables

- 2.1 Schedule of Coral Monitoring
- 2.3 Action and Limit Level for Coral Monitoring.
- 3.1 Sites 1 to 5 and Control Site C – Physical Conditions.
- 3.2 Sites 1 to 5 and Control Site C Percentage and Thickness of Sedimentation, Bleaching and Mortality of the Re-tagged Coral Colonies in Coral Re-tagging Exercise and Baseline Data Collection (November 2009) and the Present Monitoring Survey (May 2011).
- 4.1 Evaluation of Monitoring Results against Action and Limit Level for Coral Monitoring Survey.



## 1 INTRODUCTION

### 1.1 Project Background

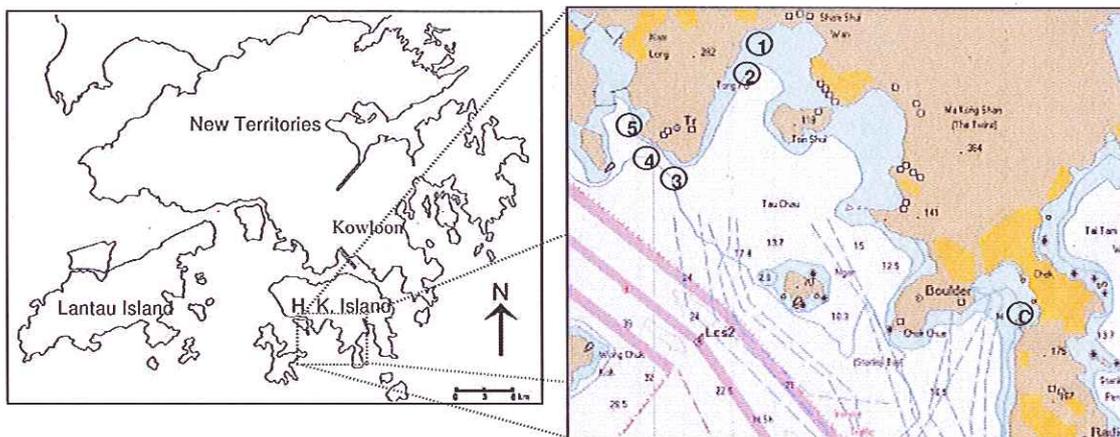
- 1.1.1 Ocean Park planned to upgrade and expand the existing area to meet the anticipated visitor demands and to position Ocean Park as a premium tourist attraction and a regional leader in the themed recreational and educational park experience.
- 1.1.2 Lam Environmental Services Limited (LAM) has been appointed to formulate a Coral Survey Team to conduct the Marine Ecology Survey for Ocean Park Corporation Master Redevelopment Project Contract No. C105 – Site Formation, Funicular Tunnel and Miscellaneous Works and Contract No. CS-03 – Thrill Mountain and Polar Adventure.
- 1.1.3 miniprojects Company Limited (miniprojects co. Ltd.) has been commissioned by LAM to undertake Coral Monitoring Survey on the tagged hard coral colonies at five Monitoring Sites around the Construction Site and one Control Site for captioned project.
- 1.1.4 In the impact monitoring surveys conducted on 16 August 2009, six out of the 60 tagged coral colonies were found to detach completely from their substrate and 46 tagging stones or marks were loss or worn out in all five Monitoring Sites and one Control Site. Such physical damage on the coral colonies and tags was believed to be caused by several strong tropical cyclones attacked Hong Kong prior to the August 2009 surveys.
- 1.1.5 miniprojects co. Ltd. has been commissioned by LAM to undertake the Coral Re-tagging Exercise and Baseline Data Re-collection on the re-tagged hard coral colonies in November 2009 at all five Monitoring Sites around the Construction Site and one Control Site and subsequent quarterly monitoring surveys since November 2009 for captioned project.
- 1.1.6 This report presents the results of the 7<sup>th</sup> Coral Monitoring Survey conducted on 27 August 2011 after Coral Re-tagging Exercise in November 2009.

## 2 METHODOLOGY

### 2.1 Monitoring Surveys – Locations

2.1.1 Five locations close to the potential impact areas were identified and designated as Impact Monitoring Sites (Sites 1 to 5; Fig. 2.1). In order to identify background environmental perturbations that are not associated with the construction, St. Stephen Beach, which is away from the impact areas, was designated as the Control Site (Control Site C; Fig. 2.1). Locations (GPS coordinates) of the five Impact Monitoring Sites and one Control Site C are summarized in Table 3.1.

**Fig. 2.1 Map Showing the Locations of the Five Impact Monitoring Sites (1 to 5) and One Control Site (C).**



### 2.2 Monitoring Requirements

2.2.1 The construction phase coral monitoring programme comprises an Initial Survey, Coral Tagging Exercise and Impact Monitoring Surveys. Initial Survey and Coral Tagging Exercise were completed on 07-12 April 2007.

2.2.2 Impact monitoring aims to determine whether impacts are occurring on tagged corals during the period of construction works commenced in June 2007. A particular focus of the Impact Monitoring is the effects of sedimentation, bleaching and mortality on corals.

2.2.3 As required in the EM&A manual, coral monitoring at Site 5 and Control Site C should be conducted twice a month at first 3 months of the construction (i.e. June, July and August 2007). The monitoring frequency would be changed to monthly for month 4 to month 6 (i.e. September, October and November 2007) if no adverse effects were recorded (Table 2.1). After that, the monitoring will be changed to quarterly from month 7 (i.e. December 2007) until the end of construction works.



- 2.2.4 Monitoring Survey for Sites 1 to 4 should be conducted monthly during the first 2 months (i.e. June and July 2007) of the construction works. If there is no exceedance recorded (Table 2.1), the monitoring frequency would be adjusted to quarterly from month 3 (i.e. August 2007) till the end of the construction period.
- 2.2.5 Several tropical cyclones, attacked Hong Kong between May and August 2009, led to serious physical damage on tagged and un-tagged coral colonies and the loss of the tagging stones and marks in all five Monitoring Sites and one Control Site. Coral re-tagging exercise and baseline data re-collection were undertaken in November 2009 (month 30) at all five Monitoring Sites around the Construction Site and one Control Site. The results will be as reference and reviewed during further Coral Monitoring surveys.
- 2.2.6 At each of the Impact Monitoring and Control Sites, 10 hard coral colonies were re-tagged for continuous monitoring over the course of construction phase. The health status of the re-tagged corals including area of bleaching and partial mortality, and level of sedimentation as percentage of sediment cover and approximate thickness of sediment on the colony and on adjacent hard substrate were recorded. The condition of each re-tagged coral colony was also recorded by taking photographs that best represents the entire colony. General physical parameters were recorded for each survey site, including visibility, weather, tidal conditions and water current.
- 2.2.7 The results of the Coral Re-tagging Exercise and Baseline Data Re-collection will be as reference and reviewed with further the Coral Monitoring Surveys.
- 2.2.8 This report presented the results of the 6<sup>th</sup> Coral Monitoring Survey in month 48 (August 2011) after Coral Re-tagging Exercise and Baseline Data Re-collection, required at Sites 1 to 5 and Control Site C. The schedule was summarized as follow,

Table 2.1 Schedule of Coral Monitoring

	Coral Monitoring Survey Date
	27 August 2011
Site 1	✓
Site 2	✓
Site 3	✓
Site 4	✓
Site 5	✓
Control Site C	✓



### 2.3 Compliance / Event Action Plan

2.3.1 Coral monitoring results were evaluated against Action and Limit Levels. Evaluation were based on recorded changes in,

- Percentage of partial mortality
- Percentage of sediment cover
- Percentage of bleaching

2.3.2 Action and Limit Levels are defined in Table 2.1

2.3.3 If the defined Action Level or Limit Levels for coral monitoring were exceeded, the stepwise procedures should be implemented in accordance to the EM&A manual to reverse the unfavourable impact on the coral communities.

Table 2.3 Action and Limit Level for Coral Monitoring

Parameter	Action Level Definition	Limit Level Definition
Sedimentation	If during Impact Monitoring a 15% increase in the percentage of sediment cover on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of sediment cover occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Limit Level is exceeded.
Bleaching	If during Impact Monitoring a 15% increase in the percentage of bleaching (bleached white) on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of bleaching (bleached white) occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Limit Level is exceeded.
Mortality	If during Impact Monitoring a 15% increase in the percentage of partial mortality on hard corals occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Action Level is exceeded.	If during the Impact Monitoring a 25% increase in the percentage of partial mortality occurs at more than 20% of the tagged coral at any one Impact Monitoring Site that is not recorded at the Control Site, then the Limit Level is exceeded.



### 3 RESULTS

#### 3.1 Sites 1 to 5 and Control Site C – Coral Monitoring Survey Date: 27 August 2011

3.1.1 Coral monitoring survey at Sites 1 to 5 and Control Site C were conducted on 27 August 2011. The physical conditions of each site are summarized in Table 3.1.

**Table 3.1 Sites 1 to 5 and Control Site C – Physical Conditions.**

Site	Site 1	Site 2	Site 3	Site 4	Site 5	Control Site C
GPS Coordinates	N 22°14'34.1" E 114°10'43.6"	N 22°14'25.39" E 114°10'37.2"	N 22°13'49.3" E 114°10'14.2"	N 22°13'53.3" E 114°10'07.3"	N 22°14'01.9" E 114°09'59.3"	N 22°12'48.3" E 114°12'51.2"
Date	27 August 2011					
Sedimentation on Rock surfaces (mm)	1-2	1-2	1-2	1-2	1-2	1-2
Visibility (m)	0.5-1.5					
Weather	South-west wind; Sunny					
Tide	Spring tide; receding tide during survey					
Current (Knot)	0-0.5	0-0.5	0.5-1.0	0.5-1.0	0-0.5	0.5-1.0

3.1.2 Percentages of sedimentation, bleaching and mortality of each re-tagged colony were presented in Tables 3.2 and 3.3. Photographs of each re-tagged coral in Sites 1 to 5 and Control Site C were illustrated in Appendices Ia to If, respectively.

#### Site 1

3.1.3 When compared with baseline data collected in November 2009, increased sedimentation was recorded on 2 colonies (A4 and A9), by 1 to 5%. Decrease in sedimentation was observed in 5 colonies (A2, A3, A5, A7 and A8) by 1 to 5%. No bleaching was recorded. Small percentage of partial mortality (2 to 5%) in colonies A2 and A7, which recorded in the baseline survey, remained unchanged (Table 3.2).

#### Site 2

3.1.4 When compared with the baseline data in November 2009, sedimentation increased in 3 colonies (B3, B4 and B9) by 4 to 5%, and decreased in 3 colonies (B1, B2 and B7) by 1 to 4%. No bleaching was recorded. Partial mortality found in 4 colonies (B3, B4, B5 and B9) in baseline survey remained unchanged (Table 3.2).

#### Site 3

3.1.5 When compared with baseline data in November 2009, 5 colonies showed increase in sedimentation (C1, C2, C5, C6 and C8) by 2 to 4%. Sedimentation decreased in 1 colony (C3) by 5%. No bleaching was recorded. Partial mortality



found in 4 colonies (C1, C2, C3, and C5) in baseline survey remained unchanged (Table 3.2).

#### Site 4

3.1.6 When compared with baseline data in November 2009, sedimentation increased in 2 colonies (E2 and E3), by 1 to 5%; sedimentation decreased in 4 colonies (E5, E6, E7 and E10) by 1 to 5%. Partial mortality found in 5 colonies (E3, E5, E6, E8 and E10) in baseline survey remained unchanged (Table 3.2).

#### Site 5

3.1.7 When compared with baseline data in November 2009, sedimentation increased in 3 colonies (D5, D8 and D9) by 1 to 5%; sedimentation decreased in 5 colonies (D1, D2, D3, and D10) by 2 to 5%. No bleaching was recorded. Partial mortality found in 5 colonies (D1, D6, D7, D9 and D10) in baseline survey remained unchanged (Table 3.2).

#### Control Site C

3.1.8 When compared with baseline data in November 2009, 6 colonies (F3, F5, F7, F8, F9 and F10) showed increase in sedimentation by 1 to 10%. Sedimentation decreased in 1 colony (F6) by 3%. No bleaching was recorded. Partial mortality found in 3 colonies (F2, F3 and F6) in baseline survey remained unchanged (Table 3.2).



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Contract No. CS-03  
Thrill Mountain and Polar Adventure

**Table 3.2 Sites 1 to 5 and Control Site C – Percentage and thickness of Sedimentation, Bleaching and Mortality of the Re-tagged Coral Colonies in Coral Re-tagging Exercise and Baseline Data Collection (November 2009) and the Present Monitoring Survey (August 2011). “▲” and “▼” indicate increased and decreased in percentage, respectively, when compared with the coral re-tagging exercise and baseline data collection.**

**Site 1**

Code	Coral Species	Area (cm <sup>2</sup> )	Sedimentation (% , mm)			Bleaching (%)			Mortality (%)				
			21 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	21 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	21 Nov 09 (baseline)	Feb 2011	May 2011
A1	<i>Platygyra carmosus</i>	1200	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
A2	<i>Favites abdita</i>	400	5.1	2.1▼	2.1▼	0.0▼	0	0	0	2	2	2	2
A3	<i>Plesiastrea versipora</i>	600	0.0	0.0	0.0	0.0▼	0	0	0	0	0	0	0
A4	<i>Leptastrea purpurea</i>	6200	0.0	5.1▲	5.1▲	5.1▲	0	0	0	0	0	0	0
A5	<i>Platygyra carmosus</i>	3200	1.1	3.1▲	0.0▼	0.0▼	0	0	0	0	0	0	0
A6	<i>Platygyra carmosus</i>	2600	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
A7	<i>Favia speciosa</i>	500	2.1	3.1▲	5.1▲	0.0▼	0	0	0	5	5	5	5
A8	<i>Platygyra carmosus</i>	1500	2.1	2.1	0.0▼	0.0▼	0	0	0	0	0	0	0
A9	<i>Leptastrea purpurea</i>	700	4.1	5.1▲	5.1▲	5.1▲	0	0	0	0	0	0	0
A10	<i>Platygyra carmosus</i>	2000	0.0	1.1▲	0.0	0.0	0	0	0	0	0	0	0

**Site 2**

Code	Coral Species	Area (cm <sup>2</sup> )	Sedimentation (% , mm)			Bleaching (%)			Mortality (%)				
			29 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	29 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	29 Nov 09 (baseline)	Feb 2011	May 2011
B1	<i>Platygyra carmosus</i>	1300	2.1	2.1	0.0▼	0.0▼	0	0	0	0	0	0	0
B2	<i>Plesiastrea versipora</i>	650	4.1	2.1▼	0.0▼	0.0▼	0	0	0	0	0	0	0
B3	<i>Psammocora superficialis</i>	4400	5.1	5.1	5.1	10.1▲	0	0	0	3	3	3	3
B4	<i>Favia speciosa</i>	800	0.0	0.0	0.0	5.1▲	0	0	0	2	2	2	2
B5	<i>Plesiastrea versipora</i>	1000	2.1	2.1	2.1	2.1	0	0	0	2	2	2	2
B6	<i>Platygyra carmosus</i>	1500	0.0	1.1▲	0.0	0.0	0	0	0	0	0	0	0
B7	<i>Hydnophora exesa</i>	1600	1.1	1.1	0.0▼	0.0▼	0	0	0	0	0	0	0
B8	<i>Plesiastrea versipora</i>	1300	0.0	0.0	0.0	0.0	0	0	0	0	0	0	0
B9	<i>Favia speciosa</i>	450	1.1	4.1▲	4.1▲	5.1▲	0	0	0	2	2	2	2
B10	<i>Psammocora superficialis</i>	400	0.0	0.0	1.1▲	0.0	0	0	0	0	0	0	0



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Contract No. CS-03  
Thrill Mountain and Polar Adventure

Site 3

Code	Coral Species	Area (cm <sup>2</sup> )	Sedimentation (% , mm)			Bleaching (%)			Mortality (%)				
			28 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	28 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	28 Nov 09 (baseline)	Feb 2011	May 2011
C1	<i>Porites sp</i>	100	2,1	4,1▲	4,1▲	4,1▲	0	0	0	3	3	3	3
C2	<i>Porites sp</i>	210	3,1	5,1▲	3,1	5,1▲	0	0	0	5	5	5	5
C3	<i>Goniopora stutchburyi</i>	410	5,1	0,0▼	0,0▼	0,0▼	0	0	0	7	7	7	7
C4	<i>Pavona decussata</i>	240	4,1	2,1▼	2,1▼	4,1	0	0	0	0	0	0	0
C5	<i>Pavona decussata</i>	210	3,1	0,0▼	0,0▼	5,1▲	0	0	0	1	1	1	1
C6	<i>Pavona decussata</i>	200	3,1	0,0▼	0,0▼	5,1▲	0	0	0	0	0	0	0
C7	<i>Montipora pelitiformis</i>	960	3,1	5,1▲	3,1	3,1	0	0	0	0	0	0	0
C8	<i>Goniopora stutchburyi</i>	140	1,1	1,1	3,1▲	5,1▲	0	0	0	0	0	0	0
C9	<i>Porites sp</i>	300	3,1	5,1▲	3,1	3,1	0	0	0	0	0	0	0
C10	<i>Cyphastrea seriatia</i>	600	4,1	4,1	2,1▼	4,1	0	0	0	0	0	0	0

Site 4

Code	Coral Species	Area (cm <sup>2</sup> )	Sedimentation (% , mm)			Bleaching (%)			Mortality (%)				
			28 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	28 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	28 Nov 09 (baseline)	Feb 2011	May 2011
E1	<i>Goniopora stutchburyi</i>	290	5,1	3,1▼	3,1▼	5,1	0	0	0	0	0	0	0
E2	<i>Coccinaraea sp.</i>	620	0,0	2,1▲	0,0	5,1▲	0	0	0	0	0	0	0
E3	<i>Goniopora stutchburyi</i>	300	4,1	3,1▼	0,0▼	5,1▲	0	0	0	3	3	3	3
E4	<i>Goniopora stutchburyi</i>	130	3,1	3,1	3,1	3,1	0	0	0	0	0	0	0
E5	<i>Goniopora stutchburyi</i>	460	6,1	6,1	3,1▼	5,1▼	0	0	0	4	4	4	4
E6	<i>Goniopora stutchburyi</i>	380	10,1	5,1▼	5,1▼	5,1▼	0	0	0	8	8	8	8
E7	<i>Goniopora stutchburyi</i>	120	3,1	5,1▲	0,0▼	0,0▼	0	0	0	0	0	0	0
E8	<i>Goniopora stutchburyi</i>	230	4,1	4,1	4,1	3,1	0	0	0	2	2	2	2
E9	<i>Goniopora stutchburyi</i>	170	3,1	5,1▲	3,1	3,1	0	0	0	0	0	0	0
E10	<i>Goniopora stutchburyi</i>	540	7,1	5,1▼	5,1▼	5,1▼	0	0	0	3	3	3	3



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Thrill Mountain and Polar Adventure

Site 5

Code	Coral Species	Area (cm <sup>2</sup> )	Sedimentation (% , mm)			Bleaching (%)			Mortality (%)				
			29 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	29 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	29 Nov 09 (baseline)	Feb 2011	May 2011
D1	<i>Psammocora</i> sp.	800	6,1	3,1▼	5,1▼	2,1▼	0	0	0	3	3	3	3
D2	<i>Montipora peltiformis</i>	600	4,1	1,1▼	1,1▼	1,1▼	0	0	0	0	0	0	0
D3	<i>Goniopora stuehburyi</i>	450	2,1	4,1▲	0,0▼	0,0▼	0	0	0	0	0	0	0
D4	<i>Cyphastrea serailia</i>	100	3,1	3,1	0,0▼	3,1	0	0	0	0	0	0	0
D5	<i>Montipora cf. turgescens</i>	320	4,1	4,1	4,1	5,1▲	0	0	0	0	0	0	0
D6	<i>Montipora peltiformis</i>	480	10,1	5,1▼	5,1▼	5,1▼	0	0	0	20	20	20	20
D7	<i>Montipora peltiformis</i>	500	8,1	5,1▼	8,1	8,1	0	0	0	2	2	2	2
D8	<i>Montipora peltiformis</i>	410	6,1	6,1	6,1	10,1▲	0	0	0	0	0	0	0
D9	<i>Montipora peltiformis</i>	200	5,1	5,1	5,1	10,1▲	0	0	0	5	5	5	5
D10	<i>Goniopora stuehburyi</i>	510	7,1	7,1	5,1▼	5,1▼	0	0	0	5	5	5	5

Control Site C

Code	Coral Species	Area (cm <sup>2</sup> )	Sedimentation (% , mm)			Bleaching (%)			Mortality (%)				
			21 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	21 Nov 09 (baseline)	Feb 2011	May 2011	Aug 2011	21 Nov 09 (baseline)	Feb 2011	May 2011
F1	<i>Goniastrea aspera</i>	450	2,1	2,1	1,1▼	2,1	0	0	0	0	0	0	0
F2	<i>Favites pentagona</i>	2100	2,1	2,1	2,1	2,1	0	0	0	2	2	2	2
F3	<i>Favites pentagona</i>	1000	0,0	1,1▲	1,1▲	5,1▲	0	0	0	5	5	5	5
F4	<i>Favites pentagona</i>	1300	2,1	2,1	2,1	2,1	0	0	0	0	0	0	0
F5	<i>Cyphastrea serailia</i>	2100	0,0	1,1▲	1,1▲	10,1▲	0	0	0	0	0	0	0
F6	<i>Porites sp</i>	2100	5,1	5,1	5,1	2,1▼	0	0	0	2	2	2	2
F7	<i>Plesiastrea versipora</i>	3000	2,1	2,1	4,1▲	4,1▲	0	0	0	0	0	0	0
F8a	<i>Favites pentagona</i>	680	0,0	0,0	1,1▲	2,1▲	0	0	0	0	0	0	0
F9	<i>Favites pentagona</i>	2600	0,0	0,0	0,0	4,1▲	0	0	0	0	0	0	0
F10	<i>Favia roiumana</i>	600	0,0	0,0	0,0	1,1▲	0	0	0	0	0	0	0



## 4 SUMMARY AND CONCLUSION

### 4.1 Summary

4.1.1 In the monitoring surveys conducted in August 2011, from all the 5 Monitoring Sites 1 to 5 and the Control Site C, the change in level of sedimentation on the tagged colonies was minor (< 10% ) when compared with the baseline data in November 2009 and previous survey in May 2011. This small change in sedimentation was likely a natural fluctuation as a result of tidal current, wave, monsoonal wind, etc. No increment in level of bleaching or partial mortality suggested the all tagged corals were in good condition and healthy.

4.1.2 The data from this monitoring survey showed no significant enhancement in sedimentation, bleaching or mortality in all the 5 Monitoring Sites 1 to 5 and the Control Site C. Hence, no adverse impact by the construction activity on the coral community was evidenced.

### 4.2 Compliance / Event Action Plan

4.2.1 The monitoring results were evaluated against the Action and Limit Levels as defined in the EM&A manual and summarized in Table 4.1.

4.2.2 Overall, the healthy status of the tagged coral colonies was normal, with low levels of sedimentation. Neither action/limit level of sedimentation, bleaching or mortality was exceeded in the monitoring survey conducted in August 2011.

**Table 4.1 Evaluation of Monitoring Results against Action and Limit Level for Coral Monitoring Survey.** Note Definition of Action/Limit levels are listed in Table 2.1. "No" indicates NO exceedance.

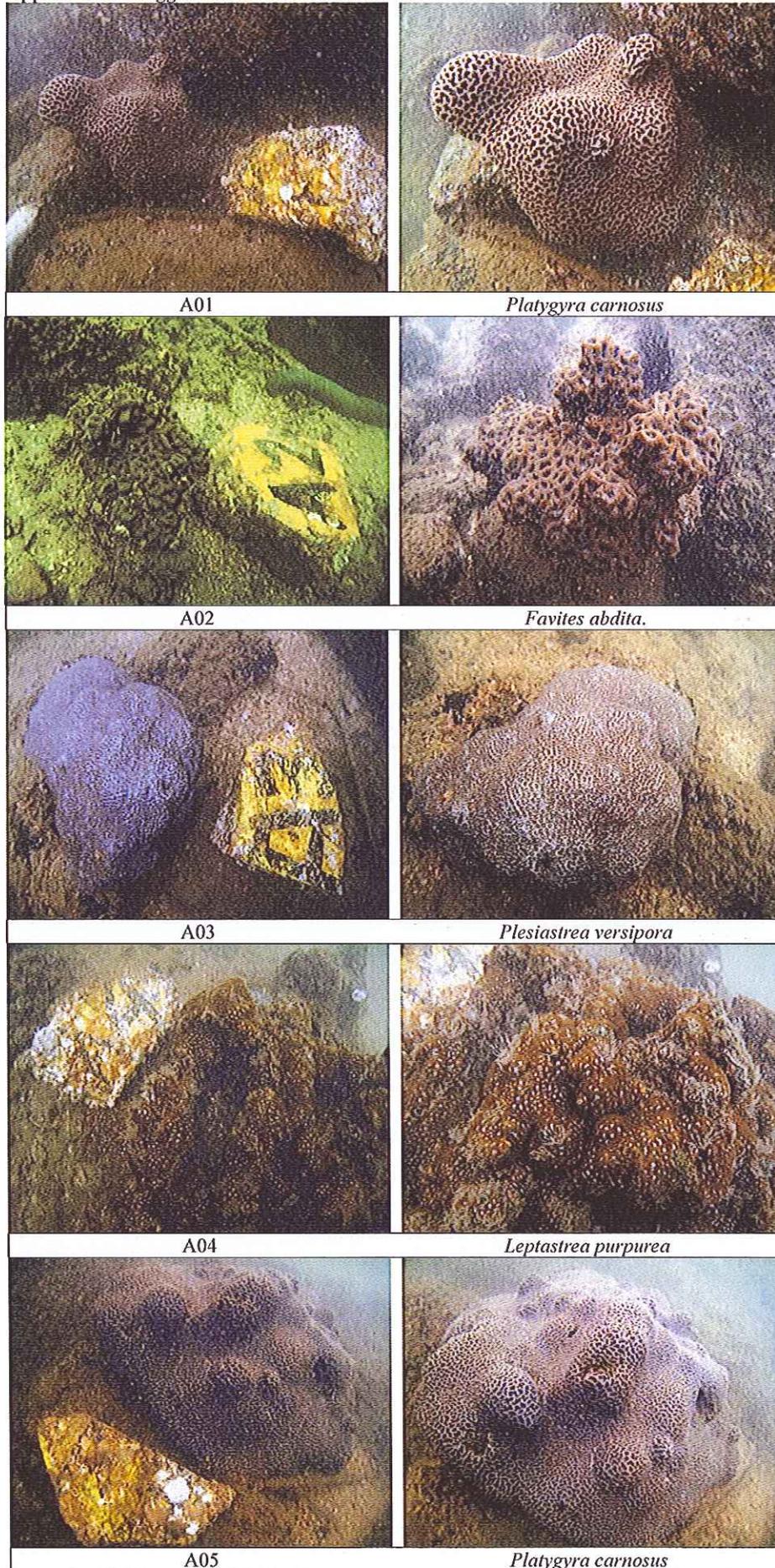
Site \ Exceedance	Sedimentation		Bleaching		Mortality	
	Action Level	Limit Level	Action Level	Limit Level	Action Level	Limit Level
Site 1	No	No	No	No	No	No
Site 2	No	No	No	No	No	No
Site 3	No	No	No	No	No	No
Site 4	No	No	No	No	No	No
Site 5	No	No	No	No	No	No
Control Site C	No	No	No	No	No	No



## APPENDIX I

### Photographs of the Tagged Corals at Sites 1 to 5 and Control Site C

Appendix Ia Tagged Coral Colonies at Site 1.



Appendix Ia Tagged Coral Colonies at Site 1...continued.



A06



*Platygyra carnosus*



A07



*Favia speciosa*



A08



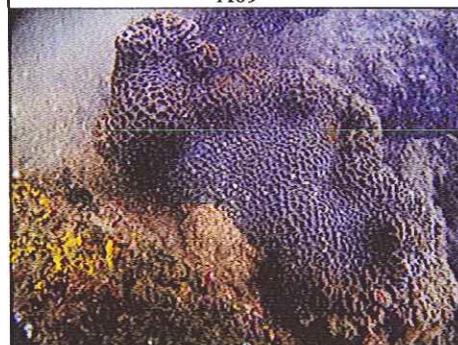
*Platygyra carnosus*



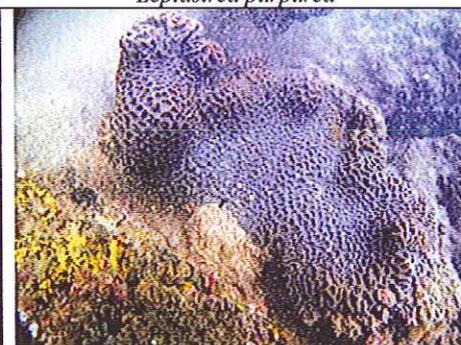
A09



*Leptastrea purpurea*



A10



*Platygyra carnosus*

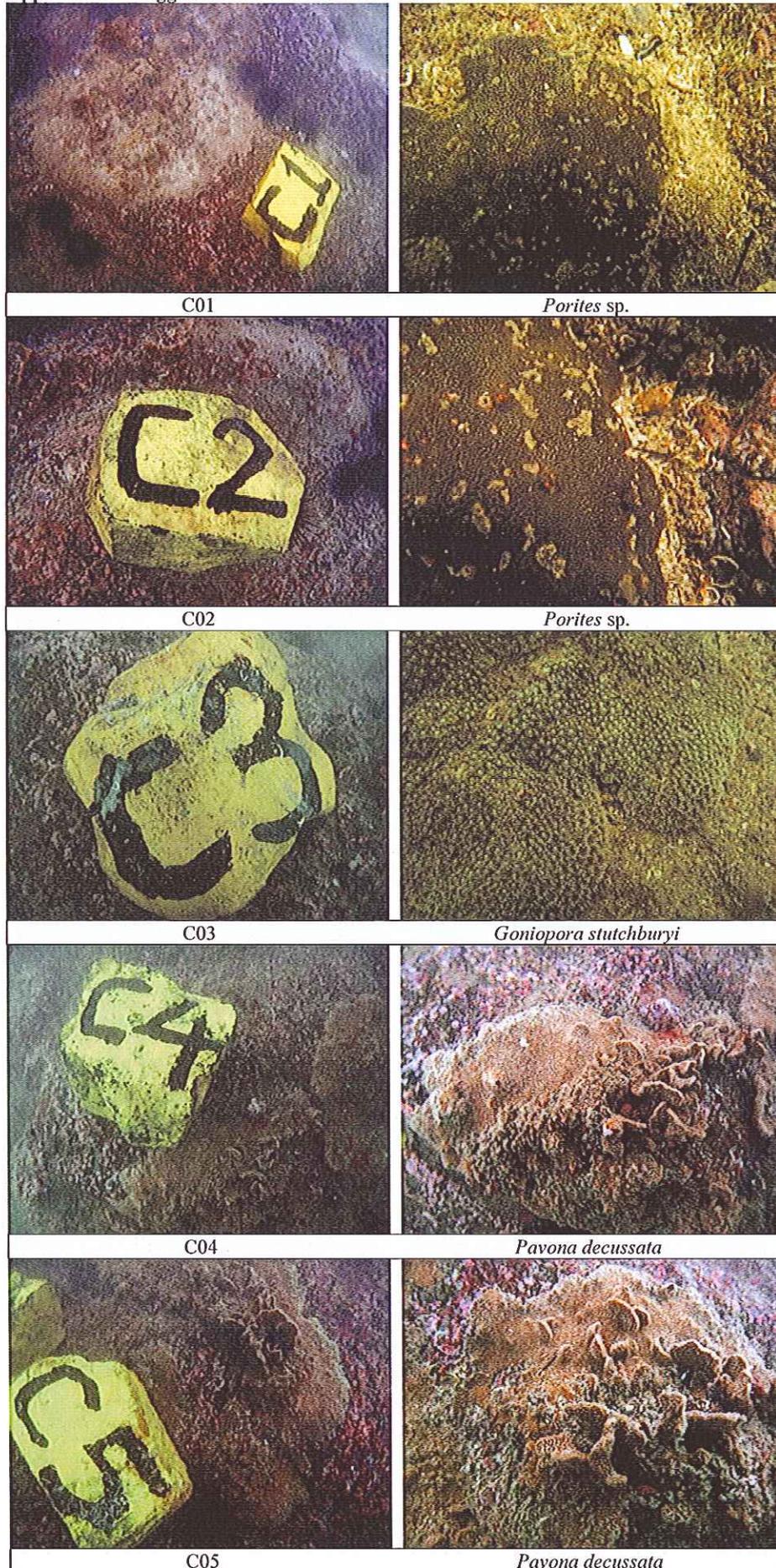
Appendix 1b Tagged Coral Colonies at Site 2.



Appendix 1b Tagged Coral Colonies at Site 2...continued.



Appendix Ic Tagged Coral Colonies at Site 3.



Appendix Ic Tagged Coral Colonies at Site 3...continued.



C06



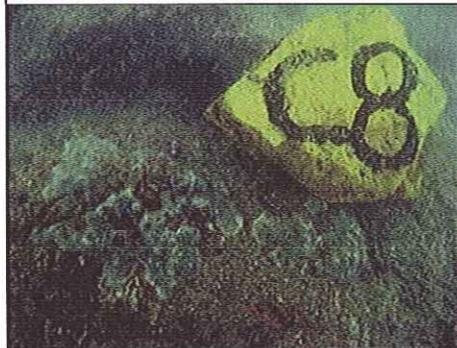
*Pavona decussata*



C07



*Montipora cf. turgescens*



C08



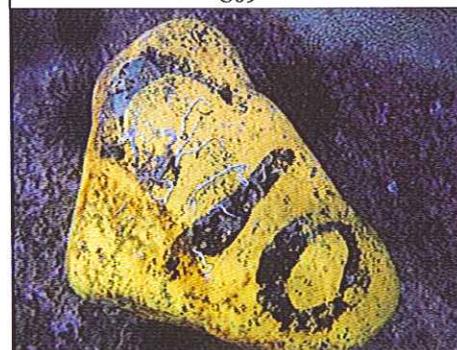
*Goniopora stutchburyi*



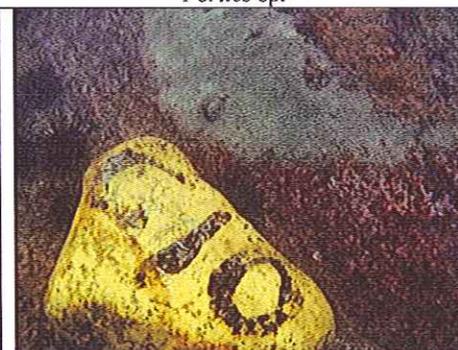
C09



*Porites* sp.

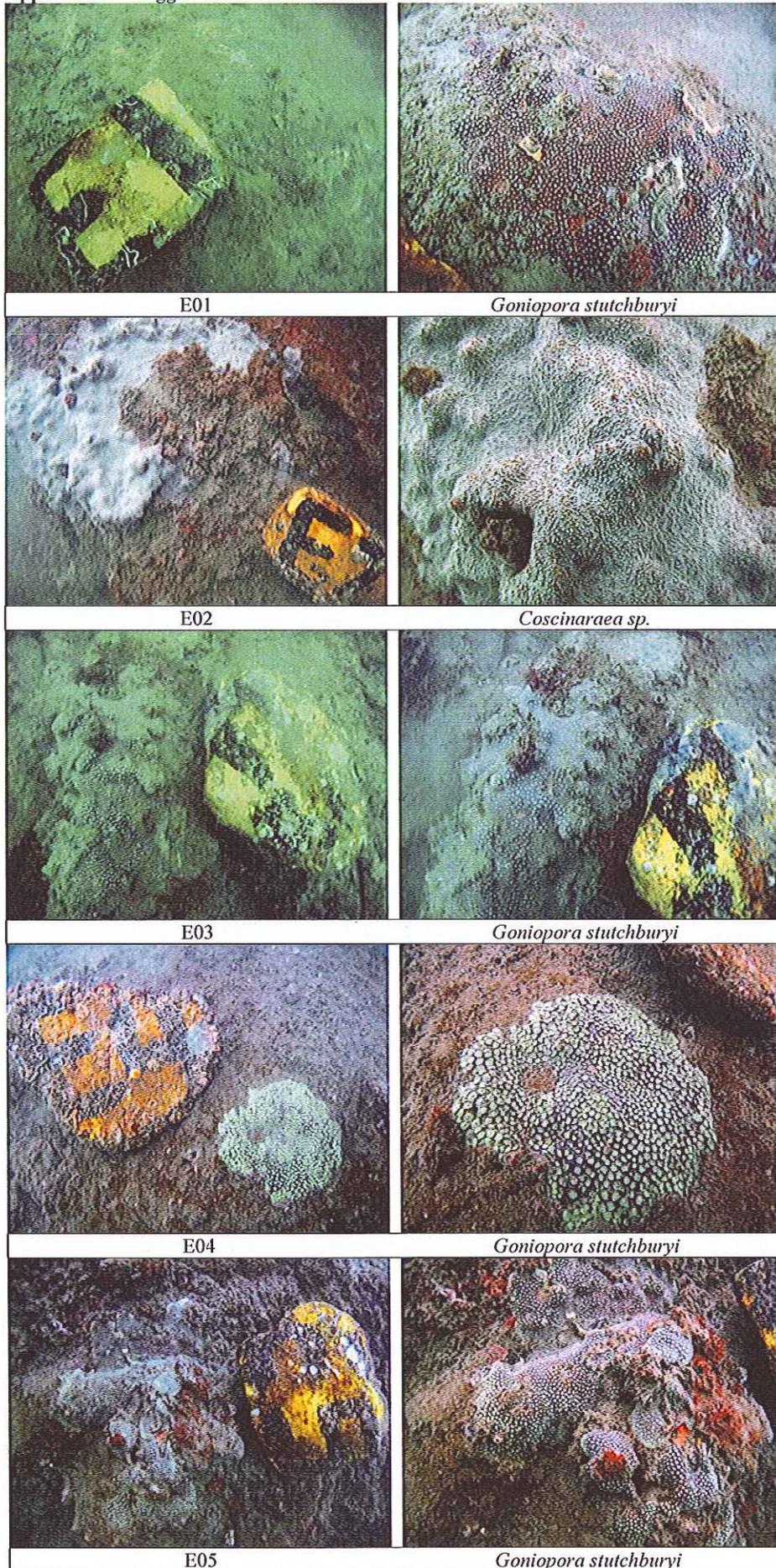


C10



*Cyphastrea serailia*

Appendix Id Tagged Coral Colonies at Site 4.



Appendix Id Tagged Coral Colonies at Site 4...continued.



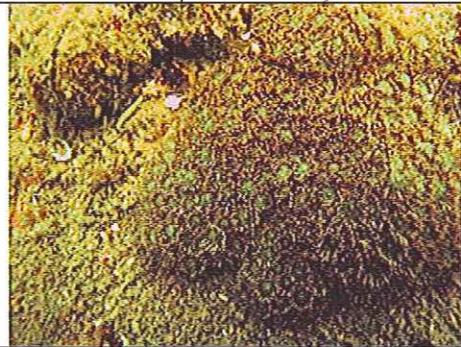
E06



*Goniopora stutchburyi*



E07



*Goniopora stutchburyi*



E08



*Goniopora stutchburyi*



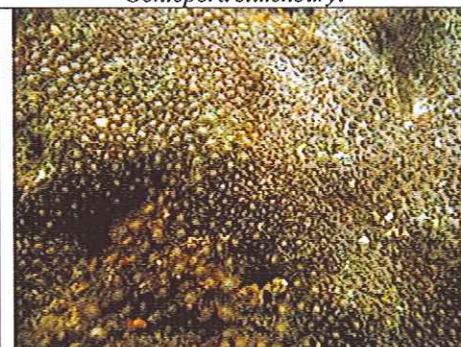
E09



*Goniopora stutchburyi*

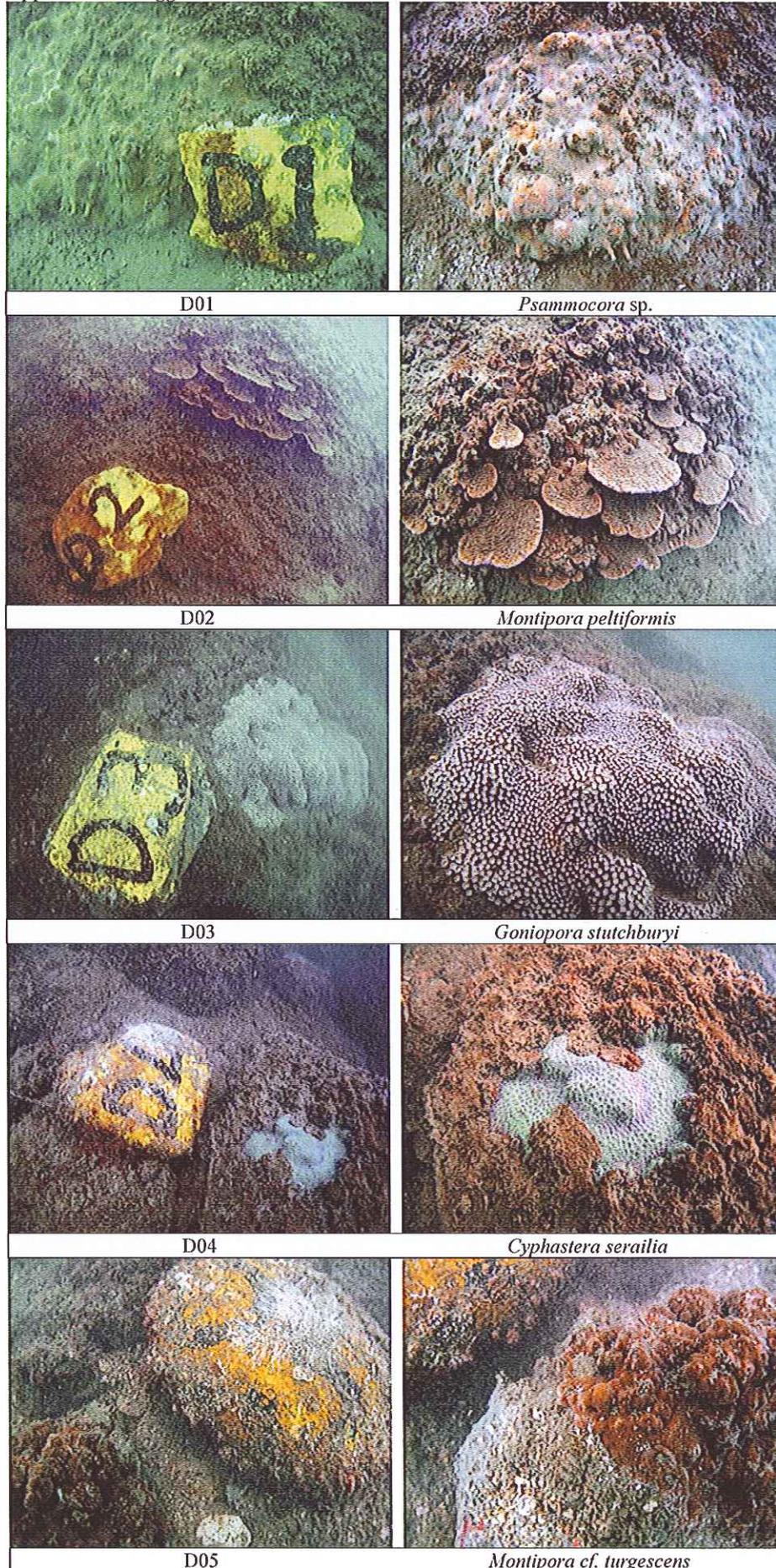


E10

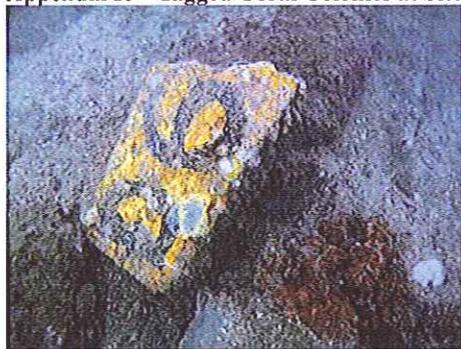


*Goniopora stutchburyi*

Appendix Ie Tagged Coral Colonies at Site 5.



Appendix Ie Tagged Coral Colonies at Site 5...continued.



D06



*Montipora peltiformis*



D07



*Montipora peltiformis*



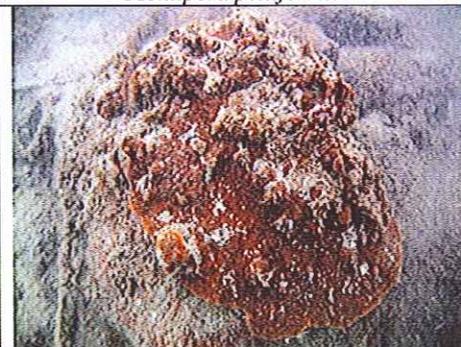
D08



*Montipora peltiformis*



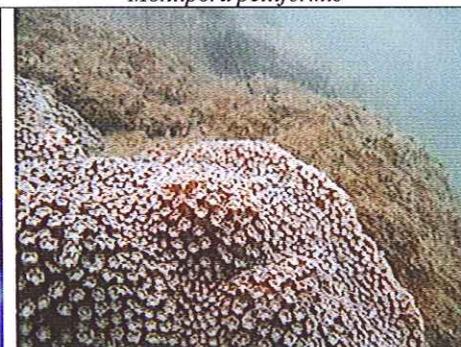
D09



*Montipora peltiformis*

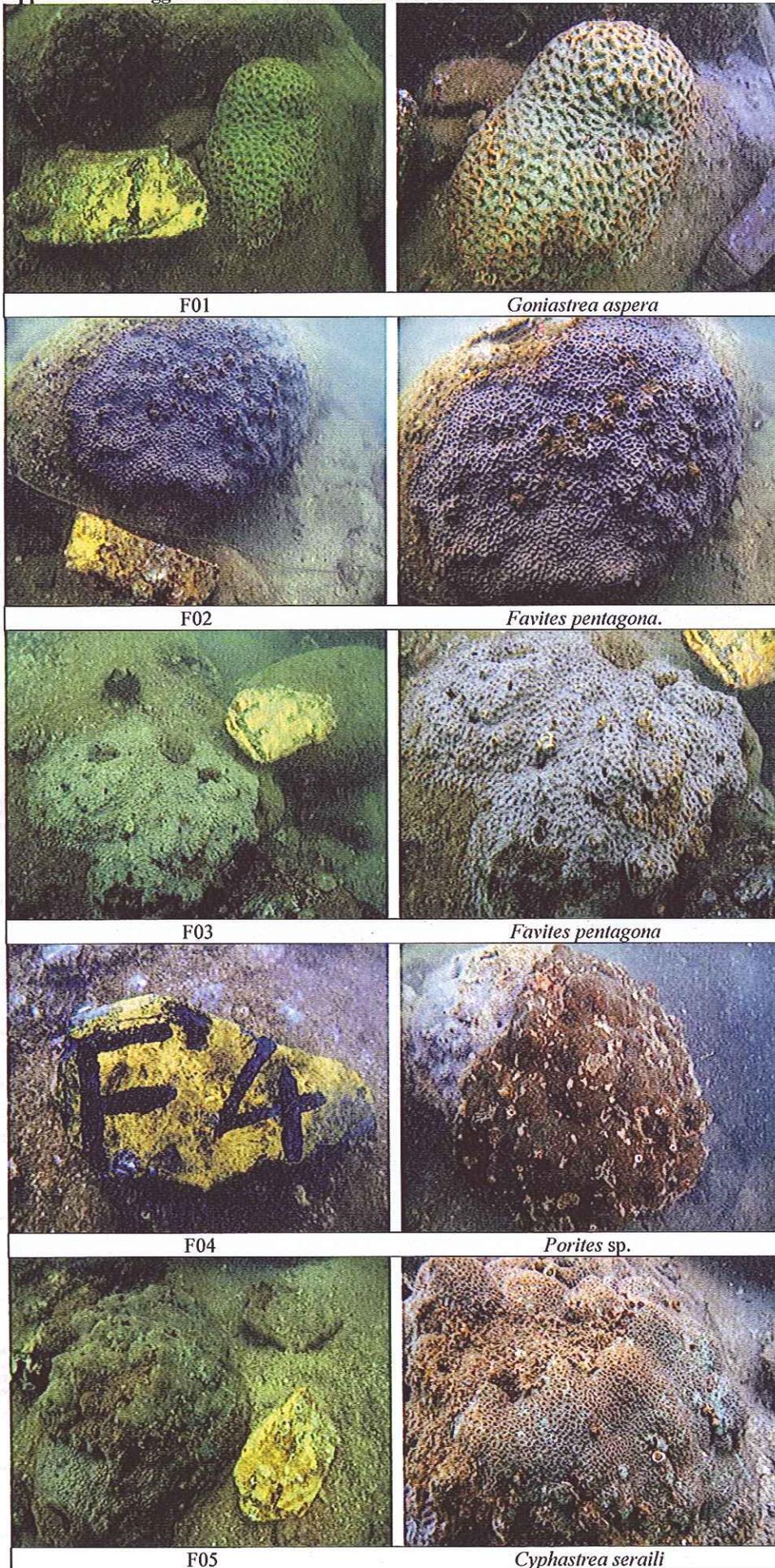


D10

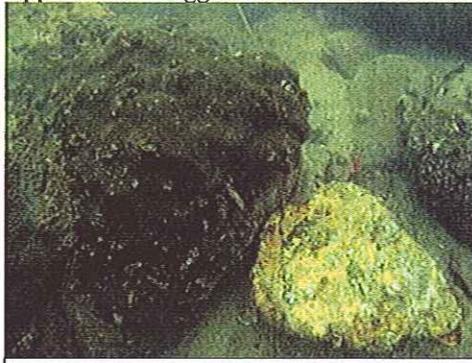


*Goniopora stutchburyi*

Appendix If Tagged Coral Colonies at Control Site C.



Appendix If Tagged Coral Colonies at Control Site C...continued.



F06



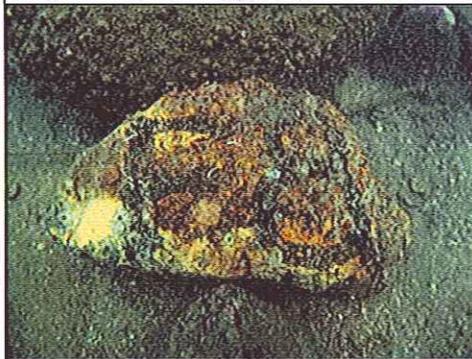
*Porites* sp



F07



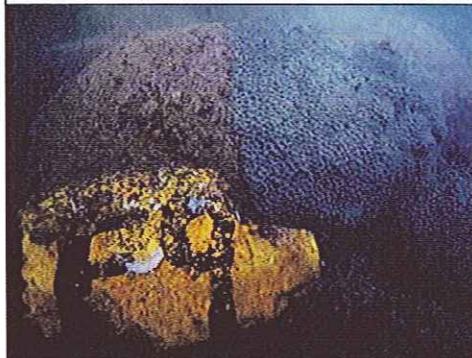
*Plesiastrea versipora*



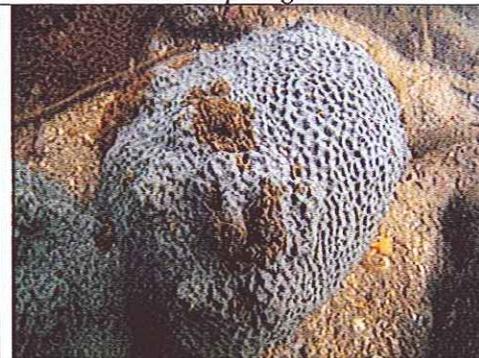
F08



*Favites pentagona*



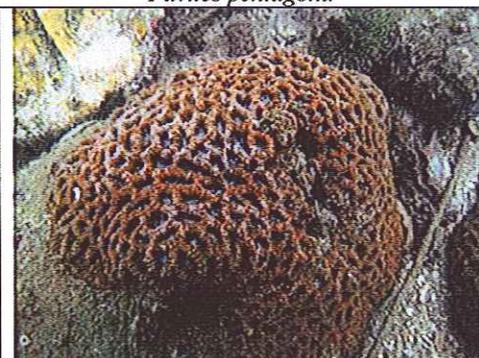
F09



*Favites pentagona*



F10



*Favia rotumana*