Territory Development Department
NT East Development Office

SHA TIN NEW TOWN STAGE II
CONTRACT NO. ST 86/2000
CONSTRUCTION OF ROAD T7 IN MA ON SHAN
ENVIRONMENTAL MONITORING AND AUDIT

MONTHLY EM&A REPORT - FEBRUARY 2004

Prepared For:

Maunsell Consultants Asia Limited

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Job No 23156

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Date 15 March 2004

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Signed
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Revision record

Revision Number	Date	Description	Prepared	Checked	Approved

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LIST OF APPENDICES

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ABBREVIATIONS AND ACRONYMS

AQO	Air Quality Objectives
Arup	Ove Arup & Partners Hong Kong Ltd
ASR	Area Sensitive Rating
BOD_5	Biochemical Oxygen Demand (5 days)
B&K	Brüel & Kjær
CFM	Cubic Feet per Minute
CHEC	China Harbour Engineering Company
CNP	Construction Noise Permit
CT	Contractor
EA	Environmental Auditor
EIA	Environmental Impact Assessment
EM&A	Environmental Monitoring and Audit
EP	Environmental Permit
EPD	Environmental Protection Department
ER	Engineer / Engineer's Representative
ET	Environmental Team
HKSAR	Hong Kong Special Administrative Region
HOKLAS	Hong Kong Laboratory Accreditation Scheme
HVS	High Volume Sampler
IEC	International Electrotechnical Commission Publications
K	Degrees Kelvin
MCAL	Maunsell Consultants Asia Limited
NAMAS	National Measurement Accreditation Service
NSR	Noise Sensitive Receiver
TDD NTE	Territory Development Department New Territory East Office
TSP	Total Suspended Particulates

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EXECUTIVE SUMMARY

This monthly EM&A report presents the site inspection findings, air quality and noise impact monitoring works for the period between 1 February 2004 and 29 February 2004.

For noise monitoring, $L_{eq(30min)}$ level was recorded once a week between the period of 0700h and 1900h at Ma On Shan Lutheran Primary School (NM2), Heng Shan House, Heng On Estate (NM3), Kam Yiu House, Kam Ying Court (NM4), Symphony Bay (NM6), Podium of block 15, Monte Vista (NM7) and Roof of block 15, Monte Vista (NM8). $L_{eq(5min)}$ was record three times once a week between the period 1900h and 2300h at NM3, NM4, NM6, NM7 and NM8.

Four measurements were taken at each location during 0700h-1900h. Four other measurements were taken at NM3, NM4, NM6 and NM8 during 1900h-2300h in February 2004. The *recorded noise levels were in the range between 60.5 and 71.0 dB(A) during 0700h-1900h and in the range between 59.0 and 65.5 dB(A) during 1900h-2300h. All measurements were below the Limit* Level of 70dB(A) for NM2 and 75dB(A) for other monitoring locations during 0700h-1900h and Limit Level of 70 dB(A) during 1900h-2300h for all monitoring locations.

For air quality monitoring, 1-hour Total Suspended Particulate (TSP) was recorded three times per six days between the period of 0700h and 1900h, and 24-hour TSP was recorded once per six days from 0000h to 2400h. Air quality monitoring was conducted at Ma On Shan Lutheran Primary School (AM2), Ma On Shan Joseph's Primary School (AM3), Villa Concerto, Symphony Bay (AM4), Club House, Monte Vista (AM5) and Kam Yiu House of Kam Ying Court (AM6).

A total of four 24-hour TSP monitoring were conducted at each location. The recorded 24-hour TSP levels were in the range between 44.3 and 287.6 $\mu g/m^3$ and were below the Action and Limit Levels.

A total of twelve 1-hour TSP measurements were taken at each location. The recorded 1-hour TSP levels were in the range between 176.4 and 236.0 $\mu g/m^3$ and were below the Action and Limit Levels.

A total of four site inspections were conducted in February 2004. Key findings of the site inspections are given below:

- Discharge point 8 was full of silt.
- The rectangular sedimentation tank at Discharge Point 4 was full of silt.
- The drainage channel at Discharge point 6 was blocked by rocks. Sandbags were not provided for flood protection.
- Wastewater from the wheel washing facility at Gate 26 was not diverted to appropriate effluent collection point.
- Road gullies along road D22 were not sealed with geotextile and U-channel along D22 was blocked by sand and rocks.
- Effluent sampling had been conducted by the Contractor on 12 February 2004..

- The de-silting pit at Discharge Point 3 was full of silt.
- Haul roads on Bridge D were dry and dusty.
- Mud trails had been found outside Gate 26.
- Oil leakage had been observed at Gate 10 Storage Yard.
- Waste had accumulated at area near Discharge Point 6.
- Chemical drums near Discharge Point 8 had not been placed inside drip trays.
- Air compressor under Bridge D was checked without noise label.
- There were totally eighteen Construction Noise Permits (CNP) in place for this project in February 2004.
- Pest control had conducted during inspections.
- Stagnant water had accumulated near Discharge Point 8.

The waste disposal data for February 2004 is given below:

A total of 16 loads of Construction and Demolition Waste (C&D waste) had been disposed of at NENT Landfill in February 2004. The total tonnage of the C&D waste disposal in February 2004 was 113.8 tonnes.

A total of 1381 loads of rocks (ϕ >400mm) had been reused at the following government project sites in February 2004:

- *Contract No. CV/2001/01 – Maintenance and Repairs to Seawalls, Piers and Other Port Works*
- *Contract No. HY/2002/21 – Hong Kong Shenzhen Western Corridor*
- *Tseung Kwan O Area 137 Public Filling Area*

The total quantity of disposed rocks was 9874.2 m^3 in February 2004.

A total of 456 loads of inert materials had been disposed of at Public Filling Area in February 2004. The total quantity of the disposed inert materials was 2736 m^3 in February 2004.

The ET was informed by the Contractor that there was no EPD site inspection in February 2004.

One public complaint regarding construction noise was received on 12 February 2004 through the EPD. The complaint had been resolved in February 2004.

The 24-hour TSP monitoring results at AM6 on 24 February 2004 exceeded the Limit Level. The dry haul roads and earth moving operation between Bridge B and C are two possible sources of exceedance. The Contractor had implemented mitigation measures and rectified unacceptable practices. No further exceedance of air quality monitoring data was found, as confirmed by the subsequent 24-hour TSP monitoring on 1 March 2004 (97.3 $\mu g/m^3$).

1. INTRODUCTION

Arup was commissioned by the Territory Development Department New Territory East Office (TDD NTE) via Maunsell Consultant Asia Limited (MCAL) to conduct the Environmental Monitoring and Audit (EM&A) for the project "*Shatin New Town, Stage II Contract No. ST 86/2000 Construction of Road 7 in Ma On Shan*" with the contract commencement on 10 January 2001.

Truck Road T7 in Ma On Shan is constructed as part of the development of the Sha Tin New Town, Stage II, which is managed by the TDD NTE. The project was commenced in January 2001 and anticipated to be completed by the January 2004. The trunk road will connect the existing Ma On Shan Road and Sai Sha Road, allowing traffic destined for north Ma On Shan, Lok Wo Sha and Sai Kung to by-pass the busy Ma On Shan Town Centre. The construction of Road T7 includes the major components listed hereunder:

1. Construction of approximately 3 kilometers of dual carriageway between Ma On Shan Road at Heng On Estate and Sai Sha Road at Cheung Muk Tau Village. About 1 kilometer of the road is on elevated structure.
2. Construction of a grade-separated interchange connecting with the widened Sai Sha Road.
3. Construction of 2 vehicular underpasses at the eastern end of Road T7.
4. Construction of about 1 kilometer of a single 2-lane carriageway starting from the existing Ma On Shan Road/Hang Hong Street roundabout, for replacing the existing access road to Ma On Shan.
5. Construction of the western extension of the existing Nin Fung Road in front of Cheung Muk Tau Village.
6. Construction of a combined pedestrian and cycle bridge across Ma On Shan Road near Ma On Shan Sewage Pumping Station.
7. Construction of 4 pedestrian subways at the western interchange connecting with the widened Sai Sha Road.
8. Construction of noise barriers and noise semi-enclosures.
9. Slope works and landscaping works associated with the above road works.

The Environmental Impact Assessment (EIA) Report[1] has identified the environmental impacts during various stages of the construction and operational stages. These include construction noise and fugitive dust during the construction stage, and the traffic noise and tunnel air quality during the operational stage. The monitoring of these environmental issues is required during the construction and operational stages and in accordance with the Brief for Environmental Monitoring and Audit[2].

The Environmental Permit (EP), no. EP-057/2000, for the Road T7 project under the EIA Ordinance has been granted on 10 May 2000[3]. The EM&A programme has commenced in January 2001 and is anticipated to be completed the February 2005.

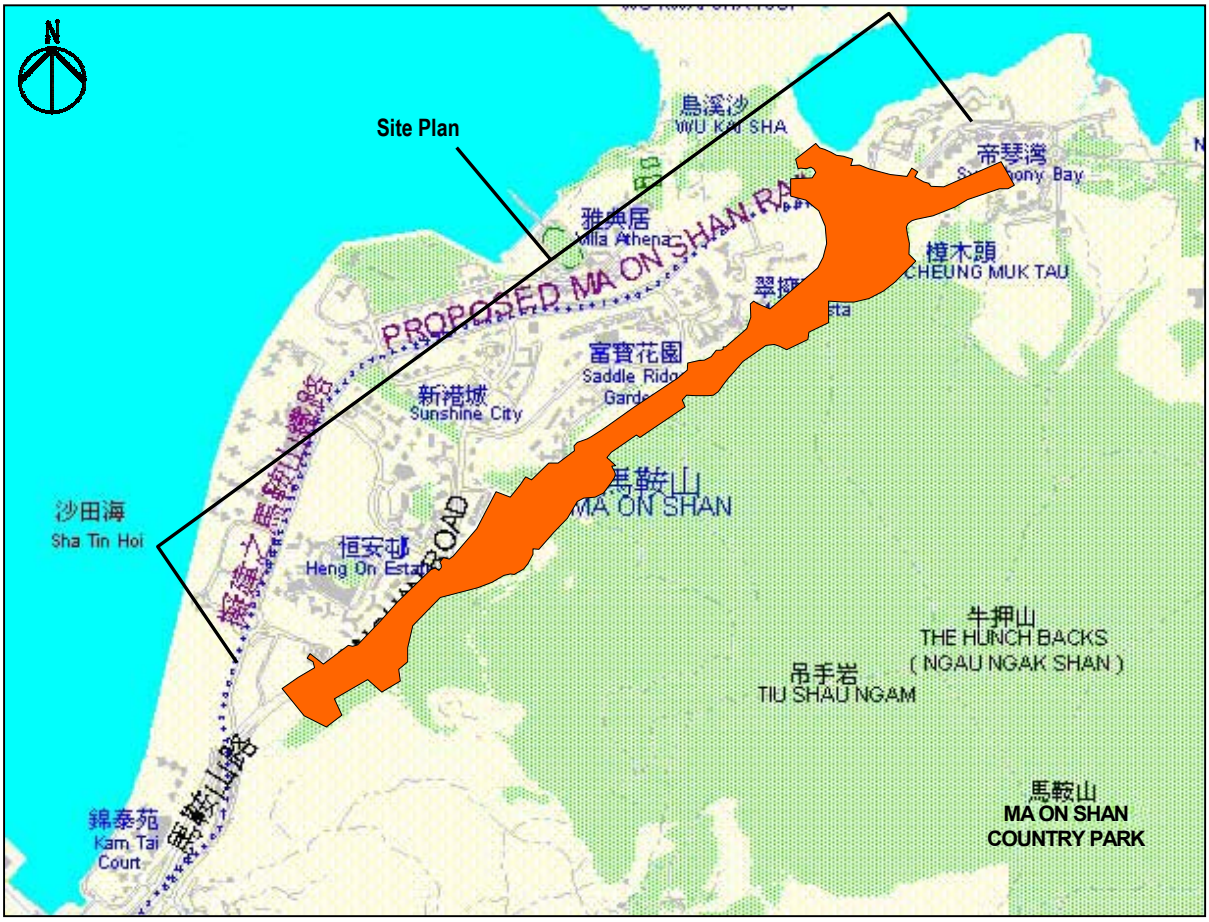
1.1 Purpose of the Report

The purpose of the EM&A report is to present the monitoring and audit results of the environmental issues, air quality and noise impacts due to the captioned road construction project on a monthly and quarterly basis. This is the thirty-ninth monthly EM&A report to summarise the EM&A requirements, the environmental status, equipment, monitoring methodology, monitoring locations, periods, frequencies, results and any observations from the noise and air measurements during February 2004.

1.2 Site Description

The site starts from the existing Ma On Shan Road (close to Heng On Estate), runs along the boundary of Ma On Shan Country Park, and terminates at Sai Sha Road (close to Symphony Bay). The site location plan is shown in Figure 1-1.

Figure 1-1 - Site location plan of construction of Road T7.



2. ENVIRONMENTAL STATUS

2.1 Construction Activities of the Month

The main construction activities in February 2004 were slope formation, construction of Bridge D, building of drainage channel and outfalls, construction of noise barriers and landscaping.

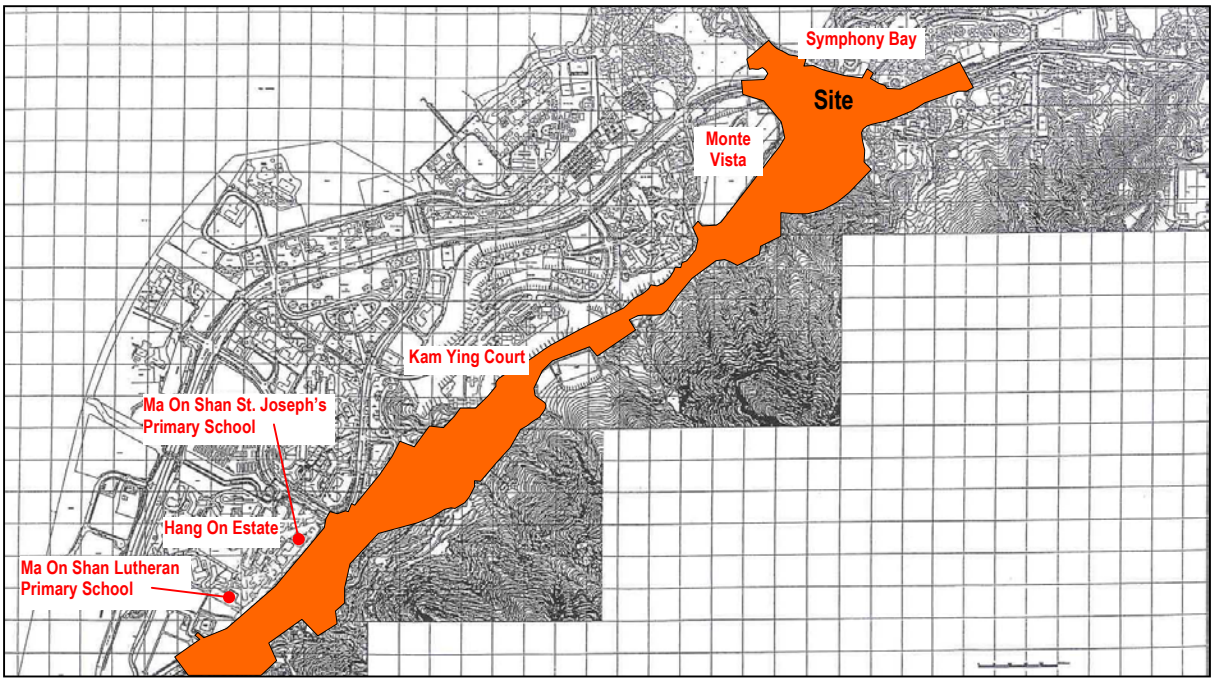
2.2 Environmental Sensitive Receivers

Several residential buildings and schools close to the site have been identified as environmental sensitive receivers in the EIA Report. They included:

- Ma On Shan Lutheran Primary School;
- Ma On Shan St. Joseph's Primary School;
- Heng On Estate;
- Kam Ying Court;
- Monte Vista; and
- Villa Concerto, Symphony Bay.

Detailed locations of the environmental sensitive receivers are shown in Figure 2-1.

Figure 2-1 - Locations of construction site and environmental sensitive receivers.



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3. SUMMARY OF EM&A REQUIREMENTS

Construction noise and air quality were significant environmental impacts identified for the construction period of the project. In accordance with the Brief for EM&A, air quality and noise impact monitoring shall be performed by an ET at all specified monitoring locations during this stage.

3.1 Construction Noise Monitoring

3.1.1 Monitoring Parameters

Construction noise monitoring shall be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). L_{10} and L_{90} will also be recorded as supplementary reference information for data auditing.

3.1.2 Monitoring Frequency

Construction noise measurements were required to be taken on a weekly basis according to the Brief for EM&A. The monitoring time periods, monitoring parameters and frequency are specified in Table 3-1. The monitoring programme for February 2004 and the planned schedule for March 2004 are provided in Appendices 1 and 2 respectively.

Table 3-1 - Construction noise monitoring parameters and frequency requirements.

Time period (when construction activity is found)	Parameters	Monitoring frequency	No of measurements for each monitoring
0700-1900 hours on normal weekdays	$L_{eq(30\ min)}$	Once per week	1
1900-2300 hours on normal weekdays	$L_{eq(5\ min)}$*		3 (consecutive)
2300-0700 hours of next day			
0700-1900 hours on holidays			

Remarks: * The $L_{eq(5\ min)}$ will only be measured if construction activities are conducted in holidays and between the period of 1900 and 0700 hours during normal weekdays.

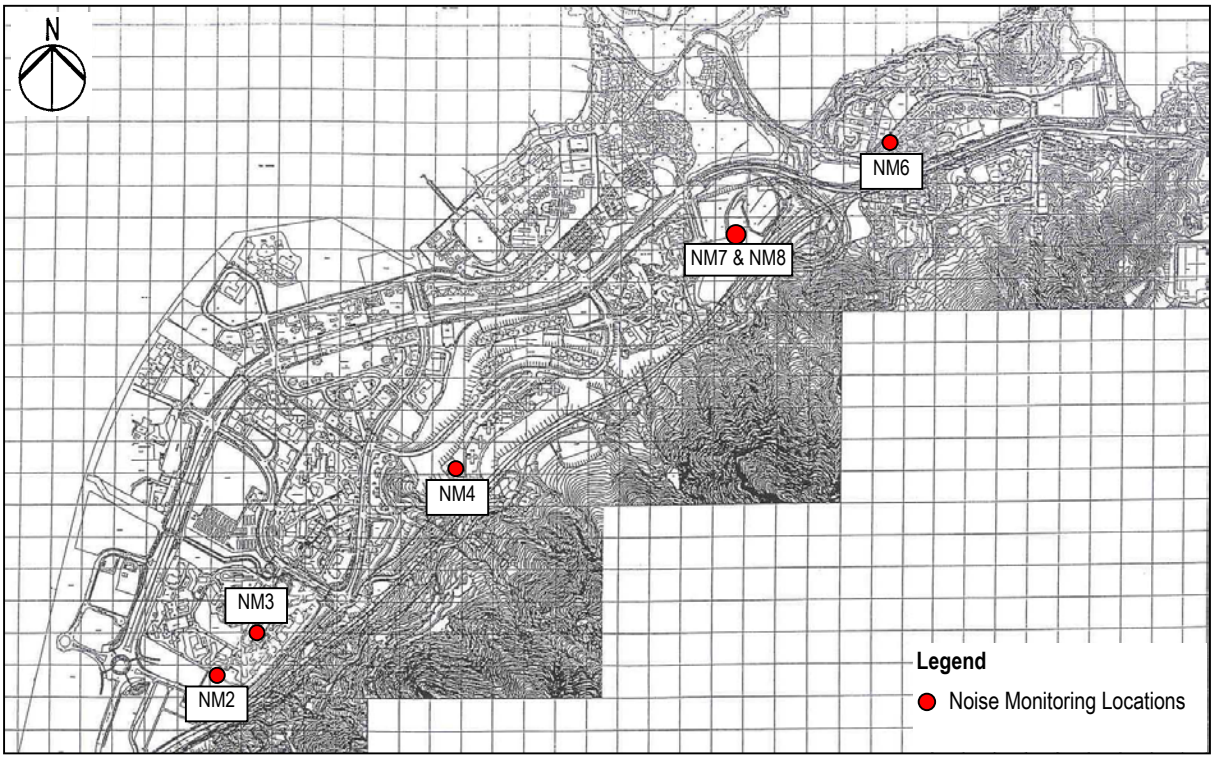
3.1.3 Monitoring Locations

A total of six monitoring locations were specified. They are given in Table 3-2 and shown in Figure 3-1. The measurements shall be taken away from any nearby reflective surface and at a position of 1.2m above ground. No façade correction is required.

Table 3-2 - Noise impact monitoring locations.

NSR no	Location	Monitoring point
NM2	Ma On Shan Lutheran Primary School	Roof-top of the school
NM3	Heng Shan House, Heng On Estate	Podium floor of Heng Shan House
NM4	Kam Yiu House, Kam Ying Court	Roof-top of Kam Yiu House
NM6	Villa Concerto, Symphony Bay	Roof-top of Block 1
NM7	Monte Vista, Block 15	Podium floor of Block 15
NM8	Monte Vista, Block 15	Roof floor of Block 15

Figure 3-1 - Location plan showing the noise impact monitoring locations



3.2 Air Quality Monitoring

3.2.1 Monitoring Parameters

Air monitoring shall be measured in terms of the TSP levels for both 24-hour and 1-hour periods.

3.2.2 Monitoring Frequency

24-hour TSP and 1-hour TSP levels shall be monitored during the course of construction according to the Brief for EM&A. The monitoring parameters and frequencies are specific in Table 3-3.

Table 3-3 - TSP monitoring parameters and frequency

Parameters	Monitoring frequency	Time period	No of measurement for each monitoring
24-hour TSP	Once per every six days	0000h – 2400h	1
1-hour TSP	Three times per every six days	0700h – 1900h	1

The monitoring programme for February 2004 and the planned schedule for March 2004 are provided in Appendix 1 and Appendix 2 respectively.

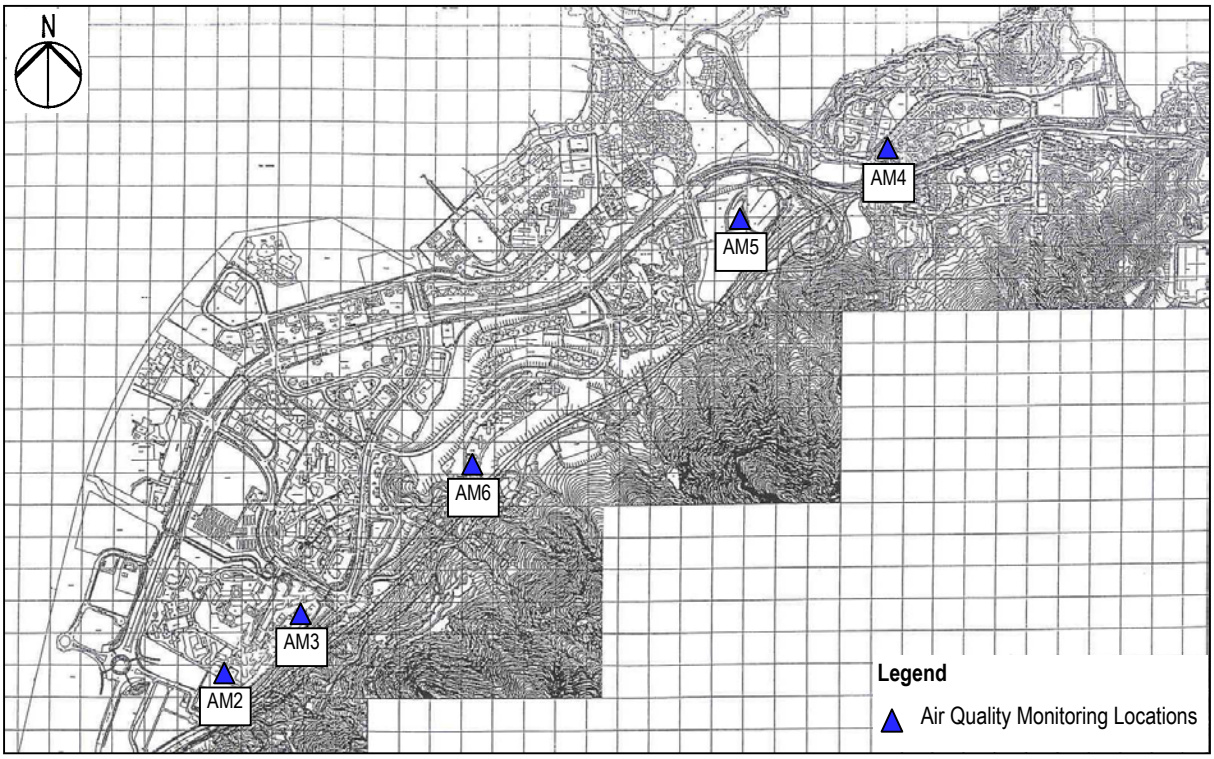
3.2.3 Monitoring Locations

Five monitoring locations nearest to the construction site were specified. They are tabulated in Table 3-4 and shown in Figure 3-2.

Table 3-4 - Air quality monitoring locations.

Sensitive Receptors No.	Location	Monitoring Point
AM2	Ma On Shan Lutheran Primary School	Roof-top of the school
AM3	Ma On Shan St. Joseph's Primary School	Roof-top of the school
AM4	Villa Concerto, Symphony Bay	Roof-top of Block 1
AM5	Monte Vista	Roof-top of Club House
AM6	Kam Ying Court	G/F of Kam Yiu House

Figure 3-2 - Location plan showing the air quality monitoring locations.



3.3 Performance Limits and Event-Action Plans

The monitoring results shall be checked against appropriate standards and requirements. A two-tier system performance limits has been established in the Project Specific EM&A Manual[4]. The "Action Level" and the "Limit Level" are established according to the EPD requirements. Corresponding actions will be taken by ET, ER and CT in accordance with the Event-Action Plans if the monitoring results exceed the performance limits.

3.3.1 Construction Noise Impact

The Action and Limit Levels for the construction noise have been established in Project Specific EM&A Manual[4] and are tabulated in Table 3-5.

Table 3-5 - Action and limit levels for construction noise.

Time period	Action level	Limit Level, dB(A)
0700 – 1900 hours on weekdays	When one documented complaint is received	75 *
0700 – 2300 hours on General Holidays; & 1900 – 2300 hours on all other days		50 or 55** (1) 65 or 70** (2)
2300 – 0700 hours of next day		55 or 40** (1) 50 or 55** (2)

Remarks: * reduced to 70dB(A) for schools and 65dB(A) during school examination periods.
** to be selected based on Area Sensitivity Rating
(1) for the SPME and prescribed works
(2) for non-SPME and prescribed works
Note: If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.

Table 3-6a and Table 3-6b detail the actions required to be carried out by different parties in the case of an exceedance of performance limits being detected.

Table 3-6a - Event-action plan for construction noise (Action Level).

Action		
ET	**ER**	**CT**
1. Notify ER and CT 2. Carry out investigation 3. Report the result of investigation to ER 4. Increase monitoring frequency to check mitigation effectiveness 5. Review the proposed remedial measures by CT and advise ER accordingly 6. Suggest any improvement or other alternative mitigation measures should the CT's proposal be found ineffective 7. Supervise the implementation of remedial measures 8. If exceedance stops, cease additional monitoring	1. Confirm receipt of notification of failure in writing 2. Notify CT 3. Require CT to propose remedial measures for the noise exceedance 4. Ensure remedial measures are properly implemented	1. Submit noise mitigation proposals to ET 2. Implement noise mitigation proposals

Table 3-6b - Event-action plan for construction noise (Limit Level).

Action		
ET	**ER**	**CT**
1. Notify ER and EPD 2. Identify source 3. Repeat measurement to confirm findings 4. Increase monitoring frequency 5. Discuss amongst ER and CT on the potential remedial actions 6. Review CT's remedial actions whenever necessary to assure their effectiveness and advise ER accordingly 7. Suggest any improvement or other alternative mitigation measures should the CT's proposal be found ineffective 8. Supervise the implementation of remedial measures 9. Inform ER and EPD of the causes for the exceedance 10. Assess effectiveness of CT's remedial actions and keep EPD and ER informed of the results 11. If exceedance stops, cease additional monitoring	1. Confirm receipt of notification of failure in writing 2. Notify CT 3. Require CT to propose remedial measures for the noise exceedance 4. Ensure remedial measures are properly implemented 5. If exceedance continues, consider what portion of the work is responsible and instruct CT to stop that portion of work until the exceedance is abated	1. Take immediate action to avoid further exceedance. 2. Inform ET, ER and EPD of the actions taken for the exceedance. 3. Submit proposals for remedial actions to ET within 3 working days of notification 4. Implement the agreed proposals 5. Resubmit proposals if problem still not under control 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated

3.3.2 Air Quality

The action and limit levels for air quality have been established in the Project Specific EM&A Manual[4] and are tabulated in Table 3-7.

Table 3-7 - Action and limit levels for air quality.

Parameters	Action level	Limit level
24 Hour TSP Level in μg/m^3	• For baseline level < 108μg/m^3, Action Level = average of baseline level plus 30% and Limit Level • For 108μg/m^3 < baseline level < 154μg/m^3, Action Level = 200μg/m^3 • For baseline level > 154μg/m^3, Action Level = 130% of baseline level	260
1 Hour TSP Level in μg/m^3	• For baseline level < 154μg/m^3, Action Level = average of baseline level plus 30% and Limit Level • For 154μg/m^3 < baseline level < 269μg/m^3, Action Level = 350μg/m^3 • For baseline level > 269μg/m^3, Action Level = 130% of baseline level	500

The baseline checking was conducted in December 2003. There was no significant difference when compare the baseline checking results of June 2003 with previous baseline checking results. Therefore, the current A/L levels for 24-hour TSP and 1-hour TSP monitoring are still representative and valid. In accordance with the Baseline Monitoring Report[5] and Baseline Checking Results in March 2002, the action and limit levels for 24-hour TSP and 1-hour TSP at different locations were established and are tabulated in Table 3-8 and Table 3-9 respectively.

Table 3-8 - Action and limit levels for 24-hour TSP.

Monitoring location	24-hour TSP Level in μg/m³		
	Baseline level *	Action level	Limit level
Ma On Shan Lutheran Primary School	66.0	173	260
Ma On Shan St. Joseph's Primary School	57.7	168	
Villa Concerto, Symphony Bay	60.8	170	
Club House, Monte Vista#	-	185	
Kam Yiu House, Kam Ying Court#	-	194	

Remarks: * Baseline levels were obtained from the Baseline Monitoring Report prepared by Manusell Consultant Asia Limited[5].

\# No baseline monitoring was conducted for Monte Vista (AM5) and Kam Ying Court (AM6) as these two locations were established after the commencement of the construction works. The Action Levels of AM5 and AM6 are established in accordance with the baseline checking results in March 2002.

Table 3-9 - Action and limit levels for 1-hour TSP.

Monitoring location	1-hour TSP Level in μg/m³		
	Baseline level *	Action level #	Limit level
Ma On Shan Lutheran Primary School	274	350	500
Ma On Shan St. Joseph's Primary School	274	350	
Villa Concerto, Symphony Bay	273	347	
Club House, Monte Vista#	-	350	
Kam Yiu House, Kam Ying Court#	-	349	

Remarks: * Baseline levels were obtained from the Baseline Monitoring Report prepared by Maunsell Consultant Asia Limited[5].

\# The Action Levels of AM2, AM3 and AM4 have been revised in accordance with the baseline checking results in March 2002.

\# No baseline monitoring was conducted for Monte Vista (AM5) and Kam Ying Court (AM6) as these two locations were established after the commencement of the construction works. The Action Levels for AM5 and AM6 were established in accordance with the baseline checking results in March 2002.

Table 3-10a and Table 3-10b detail the actions required to be carried out by different parties in case of an exceedance of performance limits being detected.

Table 3-10a - Event-action plan for air quality (Action Level).

Action		
ET	**ER**	**CT**
Action Level 1 – Exceedance for one sample		
1. Identify source 2. Inform ER 3. Repeat measurement to confirm findings 4. Review the proposed remedial measures by CT and advise ER accordingly 5. Suggest any improvement or other alternative mitigation measures should the CT's proposal be found ineffective 6. Supervise the implementation of remedial measures 7. Increase monitoring frequency to demonstrate efficacy of remedial measures 8. If exceedance stops, cease additional monitoring	1. Notify CT 2. Check monitoring data and CT's working methods	1. Rectify any unacceptable practice 2. Amend working methods if appropriate
Action Level 2 –Exceedance for two or more consecutive samples		
1. Identify source 2. Inform ER 3. Repeat measurement to confirm findings 4. Review the proposed remedial measures by CT and advise ER accordingly 5. Discuss with ER for remedial actions required 6. Suggest any improvement or other alternative mitigation measures should the CT's proposal be found ineffective 7. Supervise the implementation of remedial measures 8. Increase monitoring frequency to demonstrate efficacy of remedial measures 9. If exceedance continues, arrange meeting with ER 10. If exceedance stops, cease additional monitoring	1. Confirm receipt of notification of failure in writing 2. Notify CT 3. Check monitoring data and CT's working methods 4. Discuss with Environmental Supervisor and CT on potential remedial actions 5. Ensure remedial actions are properly implemented	1. Submit proposals for remedial actions to ER within 3 working days of notification 2. Implement the agreed proposals 3. Amend proposal if appropriate

Note: If source of exceedance is clearly identified as being not works related no further action is necessary by any party.

Table 3-10b - Event-action plan for air quality (Limit Level).

Action		
ET	**ER**	**CT**
Limit Level 1 – Exceedance for one sample		
1. Identify source 2. Inform ER 3. Repeat measurement to confirm findings 4. Discuss with ER for remedial actions required 5. Suggest any improvement or other alternative mitigation measures should the CT's proposal be found ineffective 6. Supervise the implementation of remedial measures 7. Increase monitoring frequency to demonstrate efficacy of remedial measures 8. If exceedance stops, cease additional monitoring	1. Confirm receipt of notification of failure in writing 2. Notify CT 3. Check monitoring data and CT's working methods 4. Discuss with ET and CT on potential remedial actions 5. Ensure remedial actions are properly implemented	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to ER within 3 working days of notification 3. Implement the agreed proposals 4. Amend proposal if appropriate
Limit Level 2 – Exceedance for two or more consecutive samples		
1. Identify source 2. Inform ER the causes and actions taken for the exceedance 3. Repeat measurement to confirm findings 4. Investigate the causes of exceedance 5. Arrange meeting with ER to discuss the remedial actions to be taken 6. Suggest any improvement or other alternative mitigation measures should the CT's proposal be found ineffective 7. Supervise the implementation of remedial measures 8. Increase monitoring frequency to demonstrate efficacy of remedial measures 9. If exceedance stops, cease additional monitoring	1. Confirm receipt of notification of failure in writing 2. Notify CT 3. Carry out analysis of CT's working procedures to determine possible mitigation to be implemented 4. Discuss amongst ET and CT on potential remedial actions 5. Review CT's remedial actions whenever necessary to assure their effectiveness 6. If exceedance continues, consider what portion of the work is responsible and instruct CT to stop that portion of work until the exceedance is abated	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to ER within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by ER until the exceedance is abated

Note: If source of exceedance is clearly identified as being not works related no further action is necessary by any party.

3.4 Site Inspection and Environmental Complaint Handling

3.4.1 Site Inspection Frequency and Areas Covered

Regular site inspections will be carried out on a weekly basis. The areas of inspection will cover different environmental impacts, such as air, noise, water & waste, and their pollution controls and mitigation measures for both within and outside the site area.

Ad hoc site inspection will be carried out if significant environmental non-compliance is identified. Inspections may also be carried out subsequent to receipt of any environmental complaints, or as part of the investigation work, as specified in the Event-Action Plans.

3.4.2 Site Inspection Procedures

a) The Environmental Auditor (EA) will be advised by the CT and/or ER of all information on any environmental related aspects.
b) The EA will conduct discussion with the CT and/or ER to sort out and forecast any potential environmental impact.
c) The EA will conduct a site walk with the CT and/or ER, particularly the areas with extensive construction works.
d) The EA will conduct inspection for the main environmental facilities and measures such as the wheel washing facilities located at the site exits, water spraying truck, temporary noise barrier, and the internal noise-reducing measures of the heavy equipment etc, to ensure that these environmental facilities operate normally and effectively.
e) The EA will fill up a site inspection checklist during the site inspection for recording of any special observations.
f) The EA will conduct post-discussion with the CT and/or ER for the establishment of additional/special measures if any non-conformance is found. The completion date for such additional measures will be confirmed during the post-discussion.
g) The EA will propose a reasonable timeframe together with the CT and/or ER, for the preparation of the proposal for the remediation of environmental non-compliance.
h) The completed site inspection checklist will be signed by the EA, the CT and/or ER, for reference and for taking actions in accordance with the agreed procedures, reporting systems and time frame.

3.4.3 Environmental Complaints

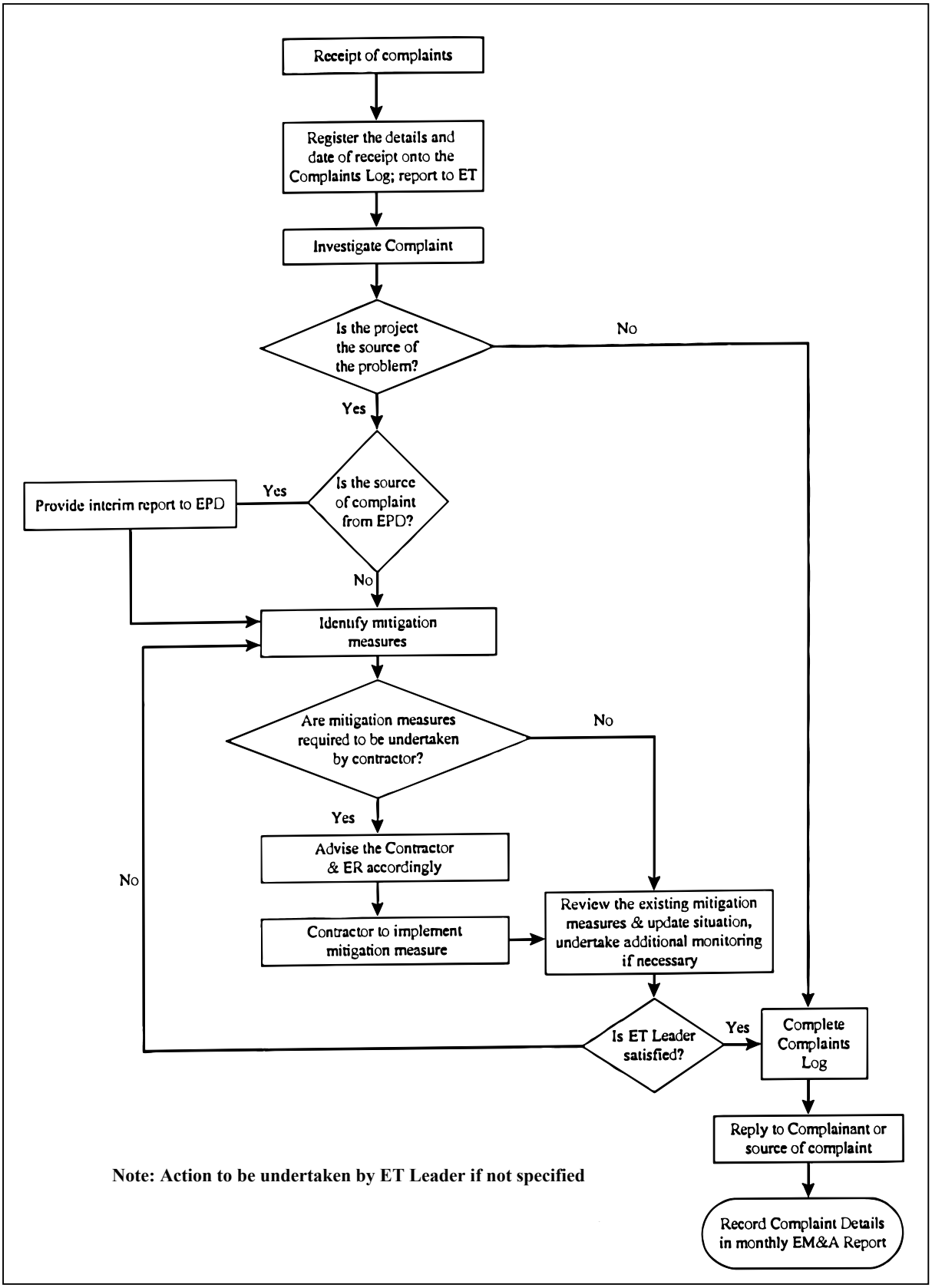
In accordance with the Brief of EM&A, environmental complaints will be referred to the ET for initiation of the complaint investigation procedures. The ET will undertake the following procedures upon receipt of the complaints:

a) The ET will record the details of the complaint and the date of receipt onto the complaint database, and inform ER immediately.
b) The ET will perform compliant investigation to determine its validity, and to assess whether the source of the problem is due to work activities.
c) The ER will instruct the CT to identify mitigation measures in consultation with the ET, if the compliant is valid and due to works.
d) The ET will liaise with the CT on their mitigation measure proposals and implementation, if required.
e) The ET will conduct review of the CT's response on the identified mitigation measures, and of the updated situation.
f) The ET will submit interim report to EPD if the complaint is received via EPD. The interim report will clearly state the status of the complaint investigation and the follow-up action within the time frame assigned by EPD.
g) The ET will undertake additional monitoring and audit to verify the situation if necessary, and ensure that any valid reason for complaint does not recur.
h) The ET will report on the investigation results and the subsequent actions to the source of complaint for responding to the complainant (If the source of complaint is via EPD, the results will be reported within the time frame assigned by EPD).
i) The ET will record the details of the complaint, investigation, subsequent actions and results in the monthly EM&A reports.

During the complaint investigation work undertaken by the ET, the CT and ER shall corporate with the ET in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified as necessary in the investigation, the CT shall promptly carry out the required mitigation to the satisfaction of ET. The ER shall ensure that such identified measures have been carried out by the CT.

A flow chart of the complaint response procedures is shown in Figure 3-3 for reference.

Figure 3-3 - Flow chart of the complaint response procedure



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4. CONSTRUCTION NOISE MONITORING

4.1 Monitoring Equipment

An integrated sound level meter was used for the noise monitoring. The sound level meter complies with the International Electrotechnical Commission Publications (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications. An acoustical calibrator in compliance with IEC 942:1988 (Type 1) was used to calibrate the sound level meter before and after each set of measurements to confirm that the data drift was less than 1dB(A). The detailed descriptions of the noise measurement equipment are listed in Table 4-1.

Table 4-1 - Equipment list for construction noise monitoring.

Equipment	Manufacturer & model no.	Precision grade	Quantity
Integrated sound level meter	Brüel & Kjær 2231	IEC 651 Type 1 IEC 804 Type 1	2
½" free-field microphone	Brüel & Kjær 4155		2
Rion Sound Level Meter	NA-27		1
Rion ½" microphone	UC53A		1
Windshield	Brüel & Kjær UA0237		4
Acoustical calibrator	Brüel & Kjær 4230	IEC 942 Type 1	1
Acoustical calibrator	Brüel & Kjær 4226		1
LCD wind speed indicator	Kestrel Vane Anemometer	--	1

4.2 Methodology

4.2.1 Field Measurement

- The sound level meter and the battery were checked to ensure that they were in proper condition.
- The sound level meter was set on a tripod at 1.2m above ground and at least 1m from the exterior of the building façade.
- Before conducting the measurement, the sound level meter was calibrated by an acoustical calibrator.
- The measurement parameter was set to A-weighted sound pressure level. The time weighting was set in fast response and the time period of measurement at 30 minutes.
- The wind speed was checked during noise monitoring to ensure the steady wind speed did not exceed 5m/s, or wind with gusts did not exceed 10m/s.
- Any abnormal conditions that generated intrusive noise during the measurement were recorded on the field record sheet.
- After each measurement, the equivalent continuous sound pressure level (L_{eq}), L_{10} and L_{90} were recorded on the field record sheet.
- The sound level meter was re-calibrated by the acoustical calibrator to confirm that there was no significant drift of reading.

4.2.2 Equipment Maintenance and Calibration

The sound level meter complies with the standards of IEC 651 (Fast, Slow, Impulse rms detector tests) and IEC 804 (L_{eq} functions). The acoustical calibrator model no. 4230 is in compliance with IEC 942. Both equipment are calibrated annually in-house using Brüel & Kjær (B&K) calibrator model no. 4226.

The B&K calibrator model no. 4226 is annually calibrated by the National Physical Laboratory in Teddington, London, which is accredited by National Measurement Accreditation Service (NAMAS). All in-house calibrations that are undertaken can be traced back to the National Physical Laboratory. The latest calibration certificates for the sound level meter and acoustic calibrators are given in the Monthly EM&A Report – September 2003 (Report No. 23156-34)[8].

4.3 Results

Four measurements were taken at each location on daytime (0700-1900) and four measurements were taken at NM3, NM4, NM6 and NM8 during 1900-2300 in February 2004. All the noise measurements were taken between 0700-2300 hours on normal weekdays during which the construction site was under normal operation. The construction daytime and evening time noise monitoring results in February 2004 are tabulated in Table 4-2 and Table 4-3 respectively. Detailed weather conditions and the monitoring period are given in Appendix 3.

Table 4-2- Construction day-time noise monitoring results for February 2004.

Date of monitoring		Monitoring parameters	Monitoring results, dB(A) (30 min)					
			NM2	NM3	NM4	NM6	NM7	NM8
Week 1	02/02/04 (Mon)	L_{eq}	65.0	67.5	68.5	68.7	67.5	66.3
		L_{10}	68.5	69.3	72.0	71.0	72.0	69.0
		L_{90}	61.5	63.5	65.5	66.5	65.5	62.5
Week 2	11/02/04 (Wed)	L_{eq}	63.0	65.0	68.5	66.5	65.8	66.5
		L_{10}	67.5	67.8	72.0	69.8	69.5	69.5
		L_{90}	61.0	62.0	66.5	61.5	61.0	63.5
Week 3	19/02/04 (Thu)	L_{eq}	65.8	67.3	67.5	69.5	68.0	66.8
		L_{10}	69.5	70.0	71.5	72.0	71.5	70.3
		L_{90}	62.0	64.0	63.0	64.0	66.5	62.5
Week 4	25/02/04 (Wed)	L_{eq}	65.8	66.7	68.5	67.5	68.5	66.5
		L_{10}	69.0	69.3	72.5	70.3	70.8	69.5
		L_{90}	62.5	62.8	63.0	63.0	64.5	62.0

Table 4-3 - Construction evening time noise monitoring results for February 2004.

Date of monitoring		Monitoring results, L_{eq} dB(A) (5 min)				
		NM3	NM4	NM6	NM7*	NM8
Week 1	02/02/04 (Mon)	63.0	63.5	62.5	-	63.8
		62.0	64.0	63.0	-	64.2
		62.8	64.5	62.8	-	64.5
Week 2	11/02/04 (Wed)	63.0	63.0	63.5	-	63.8
		63.5	63.0	63.8	-	63.5
		63.8	63.5	63.3	-	63.3
Week 3	19/02/04 (Thu)	62.5	66.0	64.0	-	64.5
		63.0	65.5	65.5	-	65.0
		62.8	66.5	65.5	-	65.0
Week 4	25/02/04 (Wed)	64.1	64.5	64.3	-	63.8
		64.5	64.2	64.5	-	63.5
		64.3	64.0	64.0	-	63.2

Noted: ***** Evening time noise monitoring is not required at monitoring station NM7 as no construction works was conducted near this station.

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5. AIR QUALITY MONITORING

Air quality was measured in terms of 24-hour and 1-hour levels of TSP. This indicated the impacts of construction dust on air quality. The 24-hour and 1-hour TSP levels were measured according to the standard high volume sampling method and laser scanning method respectively. All relevant data including temperature, pressure, weather conditions, start and stop time of the sampler, and other special phenomena and work progress of the monitoring locations were also recorded.

5.1 Monitoring Equipment

The high volume sampling method complies with the USEPA ambient air reference method standard for primary and secondary ambient particulate matter (*40 CFR_{50-B})*[7].

HVS in compliance with the specifications of *40 CFR_{50-B}* were used for carrying out the 24-hour TSP. A photometric aerosol monitor was used for 1-hour TSP monitoring. The details of the HVS, photometric aerosol monitor and the calibration kit used are listed in Table 5-1.

Table 5-1 - Equipment list for TSP monitoring.

Equipment	Manufacturer & model no	Measurement parameter	Quantity
High Volume Sampler	GMWS-2310-105	24-hour TSP	5
Fibreglass Filter	G810		--
HVS Calibration Kit	GMW-2535		1
Photometric Aerosol Monitor	MIE *personal*DataRAM	1-hour TSP	5
Hand Held Barometer	Cole-Parmer EB833	Pa, Temperature	1

5.2 Methodology

5.2.1 24-hour TSP Monitoring

- The HVS was set up at fixed monitoring location under the following criteria:
  - it was placed on a horizontal platform;
  - the filter of HVS was at least 1.3m above ground;
  - it was separated from any obstacle by at least twice the height of the obstacle protruding above the sampler;
  - there were no furnaces or incineration flues operating near the sampler;
  - it has unrestricted airflow 270° around the sampler; and
  - the wire fence and gate did not cause obstruction to the air flow.
- The flow rate of the HVS was set within the range of 1.1m^3/min and 1.7m^3/min, (39CFM - 60CFM) as specified in *40 CFR_{50-B}*.
- The power supply was checked to ensure the HVS worked properly
- The HVS was switched on and allowed to operate for 5 minutes before placing any filter on the supporting screen.

- The filter holding frame was removed by loosening the four wing nuts and allowing the brass bolts and washers to swing down out of the way.
- The fibreglass filter (G810) for TSP sampling was prepared by a HOKLAS accredited laboratory for weighing before and after sampling. Before weighing, the filter was equilibrated in a conditioned environment of:
  - temperature between 25°C and 30°C and not vary by more than 3°C; and
  - relative humidity <50% and not vary by more than 5%.
- The pre-weighted, conditioned and numbered fibreglass filter was centred, with rougher side up, on the supporting screen. The filter was aligned so that the gasket of the frame formed an airtight seal on the outer edges of the filter.
- The filter holding frame was placed onto the filter and then tightened with the brass bolts and washers with sufficient pressure to avoid air leakage from the edges.
- Any dirt accumulation from around the filter holder was wiped out and then closed the shelter lid and secured with the aluminum strip.
- A piece of flow record chart was inserted onto the flow rate recorder and placed under the chart guide clip and the time index clip so that it will rotate freely without binding. Set the time by rotating the drive hub clockwise until the correct time on chart was aligned with time index pointer.
- The flow recorder pen was checked to ensure it was inking and pressed the pen on the chart with sufficient pressure to make a visible trace.
- The timer was programmed and the start time was recorded on specified field record sheet. Other information such as the filter identification number, the weather and site conditions were also recorded.

5.2.2 1-hour TSP Monitoring

- The MIE monitor was switched on by pressing the ON/OFF button. The NEXT button was pressed to select Run or Ready mode.
- The NEXT button was pressed subsequently to check the following settings:
  - data logging function being switched on;
  - 5-min. log period;
  - the tag number for storage;
  - the analog output of 0-4.000mg/m^3;
  - the calibration factor of 1.0;
  - the averaging time of 10s;
  - enough battery charge; and
  - enough remaining memory.
- The monitoring was started by pressing ENTER. The real-time concentration was displayed as CONC and the time-averaged concentration was displayed as TWA.
- The monitoring was stopped by pressing EXIT and ENTER buttons.
- The date and start time, weather, site condition and the downloaded monitoring results were recorded on specified field record sheet.

5.2.3 Maintenance and Calibration

The HVS and their accessories were frequently checked and maintained in accordance with the manufacturer's operation & maintenance manual. Maintenance includes the checking of the supporting screen and the gasket, and routine replacement of motor carbon brushes for the blower motor. The power cords and power supply were checked each time before sampling to ensure proper operation.

The HVS are calibrated at 2-month intervals using GMW-2535 Calibration Kit which will be re-calibrated by the manufacturer after one year of use. The calibration certificate of Calibration Orifice is given in the Monthly EM&A Report – April 2003 (Report No. 23156-28)[8]. The calibration certificates of the HVS are given in the Appendix 5.

The MIE monitor and its accessories were frequently checked and maintained in accordance with the manufacturer's operation & maintenance manual to ensure proper operation. Maintenance includes the checking of batteries, zero and sensitive adjustment and filter replacement.

The MIE monitor is returned to the manufacturer for calibration bi-annually. The calibration certificates of the MIE monitor are given in the Monthly EM&A Report – April 2002 (Report No. 23156-16)[9].

5.3 Results

Air quality monitoring was conducted at monitoring stations Ma On Shan Lutheran Primary School (AM2), Ma On Shan Joseph's Primary School (AM3), Villa Concerto, Symphony Bay (AM4), Club House, Monte Vista (AM5) and Kam Yiu House, Kam Ying Court.

A total of four 24-hour TSP monitoring were conducted at each location. The 24-hour TSP monitoring results are tabulated in Table 5-2. Detailed monitoring data are given in Appendix 5.

Table 5-2 - 24-hour TSP monitoring results for February 2004.

Date of Monitoring	24-hour TSP Monitoring Results, μg/m^3				
	AM2	AM3	AM4	AM5	AM6
06/02/04 (Fri)	59.4	56.7	57.0	69.0	65.7
12/02/04 (Thu)	125.7	104.2	142.7	101.4	106.9
18/02/04 (Wed)	63.3	65.1	44.3	50.4	83.2
24/02/04 (Tue)	75.7	76.6	81.5	76.0	287.6

A total of twelve 1-hour TSP monitoring were conducted at each location. The monitoring results are tabulated in Table 5-3 and the detailed monitoring data are given in Appendix 6.

Table 5-3 - 1-hour TSP monitoring results for February 2004.

Date of Monitoring	1-hour TSP Monitoring results, µg/m³				
	AM2	AM3	AM4	AM5	AM6
02/02/04 (Mon)	215.7	203.8	208.3	208.4	203.1
	229.8	207.1	210.8	215.7	205.3
	236.0	214.6	212.6	222.1	210.6
11/02/04 (Wed)	176.4	195.2	181.3	185.2	187.6
	179.1	195.5	186.6	195.9	192.5
	180.5	198.5	188.6	200.2	194.1
19/02/04 (Thu)	194.3	210.5	207.8	203.3	214.0
	188.8	205.5	204.3	199.3	207.8
	186.0	199.9	197.5	200.0	200.4
25/02/04 (Wed)	219.7	200.3	204.1	206.5	196.1
	209.2	200.2	206.6	204.5	199.3
	211.0	200.6	206.4	202.0	199.7

6. SITE INSPECTION, ENVIRONMENTAL COMPLAINT AND NON-COMPLIANCE RECORDS

6.1 Inspection Results

Four weekly site inspections were conducted in February 2004. Key findings of the site inspections are given below:

Water Quality

- Discharge point 8 was full of silt. The Contractor had removed silt after inspection.
- The rectangular sedimentation tank at Discharge Point 4 was full of silt. The Contractor had removed the silt after inspection.
- The drainage channel at Discharge point 6 was blocked by rocks. Sandbags were not provided for flood protection.
- Wastewater from the wheel washing facility at Gate 26 was not diverted to appropriate effluent collection point. The Contractor had terminated this entrance after inspection.
- Road gullies along road D22 were not sealed with geotextile and U-channel along D22 was blocked by sand and rocks. The Contractor sealed the gullies and removed blockage after inspections.
- Effluent sampling had been conducted by the Contractor on 12 February 2004. The laboratory testing report is given in Appendix 7.
- The de-silting pit at Discharge Point 3 was full of silt. The Contractor had removed the silt after inspections. Photograph showing the silty pit is given in Figure 6-1.

Figure 6-1 – De-silting pit at Discharge Point 3.

Figure 6-2 – Oil leakage at Gate 10 Storage Yard.

Air Quality

- Haul roads on Bridge D were dry and dusty.
- Earth breaking operations had not been sprayed with water.
- Mud trails had been found outside Gate 26.

Waste Management

- Oil leakage had been observed at Gate 10 Storage Yard. Photograph showing the leakage is given in Figure 6-2.
- Waste had accumulated at area near Discharge Point 6.
- Empty chemical drums under Bridge C had not been removed from site.
- Chemical drums near Discharge Point 8 had not been placed inside drip trays.

Construction Noise

- The door of air compressor was opened at Bridge B. The Contractor had closed the door immediately during inspection.
- Air compressor under Bridge D was checked without noise label.
- There were totally eighteen Construction Noise Permits (CNP) in place for this project in February 2004 (Table 6-1). Two CNPs for the construction works near Cheung Muk Tau Village (GW-TTN0064-04) and Footbridge FB1 (GW-TN0080-04) were issued from EPD on 17 and 27 February 2004 respectively. A copy of the latest CNP is attached in Appendix 7 of this report.

Table 6-1 – Valid CNPs in February 2004

No	CNP No.	Location	Date of Issue	Date of Expiry
1	GW-TN0272-03	Near Saddle Ridge Garden	18 August 2003	18 February 2004
2	GW-TN0273-03	Near Heng On Estate	13 August 2003	23 February 2004
3	GW-TN0276-03	Near Cheung Muk Tau Village	16 August 2003	16 February 2004
4	GW-TN0280-03	Near Heng On Estate	20 August 2003	23 February 2004
5	GW-TN0285-03	Near Lee On Estate	22 August 2003	29 February 2004
6	GW-TN0324-03	Near Heng On Estate	9 September 2003	9 March 2004
7	GW-TN0325-03	Near Kam Ying Court	18 September 2003	20 March 2004
8	GW-TN0329-03	Bridge TC3, TC4, TC5 and TC6	22 September 2003	23 March 2004
9	GW-TN0334-03	Near Cheung Muk Tau Tsuen	22 September 2003	27 March 2004
10	GW-TN0341-03	Near Heng On Estate	7 October 2003	8 April 2004
11	GW-TN-344-03	Near Kam Ying Court	15 October 2003	15 March 2004
12	GW-TN-364-03	Near Monte Vista and Cheung Muk Tan Village	27 October 2003	30 April 2004
13	GW-TN0381-03	Near Heng On Estate	3 November 2003	2 May 2004
14	GW-TN0398-03	Near Kam Ying Court	19 November 2003	20 May 2004
15	GW-TN0418-03	Near Monte Vista and Cheung Muk Tau Village	5 December 2003	4 June 2004
16	GW-TN0033-04	Near Heng On Estate	30 January 2004	22 June 2004
17	GW-TN0064-04	Near Cheung Huk Tau Village	17 February 2004	17 August 2004
18	GW-TN0080-04	Near Footbridge FB1	27 February 2004	26 August 2004

Other Issues

- Pest control had conducted during inspections.
- Stagnant water had accumulated near Discharge Point 8. Contractor had removed it after site inspection.

6.2 Waste Disposal

6.2.1 Waste Disposal Data for February 2004

The waste disposal data for February 2004 is given below:

A total of 16 loads of Construction and Demolition Waste (C&D waste) had been disposed of at NENT Landfill in February 2004. The total tonnage of the C&D waste disposal in February 2004 was 113.8 tonnes.

A total of 1381 loads of rocks (ϕ >400mm) had been reused at the following government project sites in February 2004:

- *Contract No. CV/2001/01 – Maintenance and Repairs to Seawalls, Piers and Other Port Works*
- *Contract No. HY/2002/21 – Hong Kong Shenzhen Western Corridor*
- *Tseung Kwan O Area 137 Public Filling Area*

The total quantity of disposed rocks was 9874.2 m^3 in February 2004.

A total of 456 loads of inert materials had been disposed of at Public Filling Area in February 2004. The total quantity of the disposed inert materials was 2736 m^3 in February 2004.

6.3 EPD Site Inspection

The ET was informed by the Contractor that there was no EPD site inspection in February 2004.

6.4 Complaint Record

One public complaint regarding construction noise was received on 12 February 2004 through the EPD. The complaint had been resolved in February 2004. A correspondence on the public complaints is given in Appendix 8.

6.5 Non-compliance Record

The 24-hour TSP monitoring results at AM6 on 24 February 2004 exceeded the Limit Level. The dry haul roads and earth moving operation between Bridge B and C are two possible sources of exceedance. The Contractor had implemented mitigation measures and rectified unacceptable practices. No further exceedance of air quality monitoring data was found, as confirmed by the subsequent 24-hour TSP monitoring on 1 March 2004 (97.3 $\mu g/m^3$).

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7. REFERENCES

[1] Truck Road T7 in Ma On Shan - Environmental Impact Assessment Study, Final Assessment Report, Maunsell Consultants Asia Limited.

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[3] Environmental Permit No. EP-057/2000 for the Designated Project "Truck Road T7 in Ma On Shan", Environmental Protection Department, HKSAR.

[4] Trunk Road T7 in Ma On Shan - Environmental Monitoring and Audit Manual, Maunsell Consultant Asia Limited, HKSAR.

[5] Sha Tin New Town, Stage II Contract No. ST 86/2000 Construction of Road T7 in Ma On Shan - Baseline Monitoring Report, Maunsell Consultants Asia Ltd.

[6] Sha Tin New Town, Stage II Contract No. ST 86/2000 Construction of Road T7 in Ma On Shan Monthly EM&A Report – September 2003, Ove Arup & Partners Hong Kong Limited.

[7] Title 40 of the Code of Federal Regulations, Chapter 1, Part 50 - National Primary and Secondary Ambient Air Quality Standards, Appendix B - Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-volume Method), Environmental Protection Agency, US.

[8] Sha Tin New Town, Stage II Contract No. ST 86/2000 Construction of Road T7 in Ma On Shan Monthly EM&A Report – April 2003, Ove Arup & Partners Hong Kong Limited.

[9] Sha Tin New Town, Stage II Contract No. ST 86/2000 Construction of Road T7 in Ma On Shan Monthly EM&A Report – April 2002, Ove Arup & Partners Hong Kong Limited.