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EXECUTIVE SUMMARY

Introduction

Maunsell Environmental Management Consultants Limited (MEMCL) is the designated Environmental Team (ET) for “Reprovisioning of Diamond Hill Crematorium” (The Project). This is the second monthly Environmental Monitoring and Audit (EM&A) report prepared by MEMCL for the Project. The EM&A programme for the Project commenced on 29 October 2004. This report documents the findings of EM&A Works conducted in the month of December 2004 (1 to 31 December 2004).

As informed by the Contractor, construction activities in the reporting period were:

- Erection of hoarding;
- Break up existing pavement;
- Demolish existing tunnel; and
- Installation work in transformer room.

A summary of monitoring and audit activities conducted in the reporting period is listed below:

1-hour TSP monitoring	5 sessions
24-hour TSP monitoring	5 sessions
Daytime noise monitoring	4 sessions
Environmental site inspection	5 sessions

Breaches of Action and Limit Levels

Air Quality

All 1-hour TSP monitoring results recorded in the month complied with the Action and Limit Levels.

One Action Level exceedance of 24-hour TSP was recorded in the month. The exceedance recorded in the month was concluded not due to construction works of the Project.

Construction Noise

All noise monitoring results recorded in the month complied with the Action and Limit Levels.

Implementation Status of Environmental Mitigation Measures

In general, the Contractor satisfactorily implemented all the required mitigation measures and was reasonably responsive to the ET’s recommendations on any discrepancy observed during the weekly environmental site inspection.

Environmental Complaints, Notification of Summons and Successful Prosecutions

No environmental complaint, notification of summons or successful prosecution was received or made against this Project in the month.

Reporting Changes

No reporting change was required in the month.

Future Key Issues

Key issues to be considered in the coming month include:

- Generation of dust from activities on-site;

- Noise impact from operating equipment and machinery on-site;
- Generation of site surface runoffs and wastewater from activities on-site;
- Storage and disposal of general refuse and construction waste from activities on-site;
- Management of chemicals and avoidance of oil spillage;

摘要

簡介

茂盛環境管理顧問有限公司乃「重置鑽石山火葬場」[下稱(工程項目)]的指定環境小組。本冊是茂盛為工程項目製作的第二份每月環境監察及審核報告。工程項目的環境監察及審核由二零零四年十月廿九日開始、本報告記錄了十二月份(十二月一日至十二月三十一日)所進行的環境監察及審核工作。

根據承建商的資料，本月有以下的建築活動：

- 豎立圍街板
- 拆毀現存路面
- 拆毀現存坑道
- 在變壓房進行安裝工程

本月有下列幾項的監察及審核活動：

一小時總懸浮粒子監察	5次
廿四小時總懸浮粒子監察	5次
日間噪音監察	4次
環境巡查	5次

違反監察標準

空氣質素

本月所有一小時總懸浮粒子監測結果皆符合行動水平和極限水平。

本月錄得一個廿四小時總懸浮粒子監測結果超出行動水平。調查推斷出此結果與本工程項目的建築活動無關。

建築噪音

本月所有噪音監測結果皆符合行動水平和極限水平。

環境影響緩和措施

承建商大致上完成所需的緩和措施，同時已對環境小組在每週的環境巡查中的建議作出合理的回應及跟進。

有關環境的投訴，傳票及檢控

本月沒有收到有關環境的投訴，傳票及檢控。

報告修訂

本月並沒有修訂報告

預計要注意的事項

下月要注意事項包括：

- 工程活動所產生的塵埃
- 操作中儀器及機器產生的噪音影響
- 工程活動所產生的污水
- 普通廢物與建築廢物的暫貯及棄置
- 化學品的管理及防止意外漏油

1. INTRODUCTION

Background

- 1.1 Maunsell Environmental Management Consultants Limited (MEMCL) (hereinafter called the “ET”) was appointed by China Resources Construction Company Limited (CRC) (hereinafter called the “Contractor”) to undertake Environmental Monitoring and Audit for “Reprovisioning of Diamond Hill Crematorium” (hereinafter called the “Project”). Under the requirements of Section 4 of Environmental Permit EP-179/2004, EM&A programme as set out in the approved EM&A Manual is required to be implemented. In accordance with the approved EM&A Manual, environmental monitoring of air quality and noise and environmental site inspections are required for the Project.

Scope of Report

- 1.2 The EM&A programme for the Project commenced on 29 October 2004. This report presents a summary of the environmental monitoring and audit works, list of activities, and mitigation measures for the Project in December 2004 (from 1 to 31 December 2004).

Project Organisation

- 1.3 The organisation of the environmental management team is shown in Figure 1.1. Key personnel contacts are presented in Appendix A.

Environmental Status in the Reporting Month

- 1.4 The construction programme of the Project is provided in Appendix B. In the month, the following activities took place for the construction of the Project:

- Erection of hoarding;
- Break up existing pavement;
- Demolish existing tunnel; and
- Installation work in transformer room.

- 1.5 Layout plan of the Project work site is provided in Figure 1.2.

Summary of EM&A Requirements

- 1.6 The description and detailed locations of sensitive receivers and monitoring stations for air quality and noise are shown in Figures 2.1 and 3.1 respectively and relevant sections of this Report.

- 1.7 The EM&A programme require environmental monitoring for air quality and noise and environmental site inspections for air quality, noise, water quality, landscape and visual, and waste management. The EM&A requirements for each parameter described in the following sections include:

- All monitoring parameters
- Action and Limit levels for all environmental parameters
- Event and Action Plans
- Environmental mitigation measures, as recommended in the project final EIA report
- Environmental requirements in contract documents.

- 1.8 The advice on the implementation status of environmental protection and pollution control/mitigation measures is summarised in Appendix J of the Report.

2. AIR QUALITY

Monitoring Requirements

- 2.1 1-hour and 24-hour TSP levels at two designated monitoring stations were monitored in the month in accordance with the EM&A Manual. Appendix C shows the established Action and Limit Levels for the environmental monitoring works.
- 2.2 The monitoring schedule for month is shown in Appendix D. Air quality monitoring stations for 24-hour and 1-hour TSP measurements are shown in Figure 2.1.

Monitoring Equipment

- 2.3 Portable dust meter was used to carry out 1-hour TSP monitoring. High volume sampler (HVS - Model GMWS-2310 Accu-Vol) completed with the appropriate sampling inlets was installed for 24-hour TSP sampling. The HVS meet all the requirements as specified in the approved EM&A Manual. Table 2.1 summarised the equipment that were used in the dust-monitoring programme.

TABLE 2.1 AIR QUALITY MONITORING EQUIPMENT

Equipment	Model
Dust Meter (for 1-hour TSP measurement)	Laser Dust Monitor – Model LD-3
HVS (for 24-hour TSP measurement)	GMWS 2310 Accy-Vol system
Calibration Kit (for HVS)	GMW 25

Monitoring Parameters, Frequency and Duration

- 2.3 Table 2.2 summarised the monitoring parameters, frequency and duration of impact air quality monitoring.

TABLE 2.2 AIR QUALITY MONITORING PARAMETERS, FREQUENCY AND DURATION

Parameter	Duration	Frequency
1-hour TSP	1 hour	3 times every six days
24-hour TSP	24 hours	Once every six days

Monitoring Locations

- 2.4 In accordance with the EM&A Manual, two air quality monitoring stations, as shown in Figure 2.1 were selected for 24-hour and 1-hour TSP sampling. Table 2.3 describes the location of the air quality monitoring stations.

TABLE 2.3 LOCATIONS OF AIR QUALITY MONITORING STATIONS

Monitoring Station	Identity / Description	Level
ASR8	Po Leung Kuk Grandmont Primary School	Roof top level of 7 storey building
ASR17	Staff Quarter for Diamond Hill Crematorium	Roof top level of 1 storey building

Monitoring Methodology

1-hour TSP Monitoring

Monitoring Procedure

2.5 The measuring procedures of 1-hour TSP by a portable dust meter are in accordance with the Manufacturer's Instruction Manual as follows:

- Set POWER to "ON", push BATTERY button, make sure that the meter's indicator is in the range with a red line and allow the instrument to stand for about 3 minutes (Then, the air sampling inlet has been capped).
- Push the knob at MEASURE position.
- Push "O-ADJ" button. (Then meter's indication is 0).
- Push the knob at SENSI ADJ position and set the meter's indication to S value described on the Test Report using the trimmer for SENSI ADJ.
- Pull out the knob and return it to MEASURE position.
- Push "START" button.

Maintenance and Calibration

- The 1-hour TSP dust meters are verified at 1-year intervals throughout all stages of the impact air quality monitoring.
- Calibration details for the dust meters are provided in Appendix E.

24-hour TSP Monitoring

Installation

2.6 The HVSs were installed in the vicinity of the air sensitive receivers. The following criteria were considered in the installation of the HVSs:

- A horizontal platform with appropriate support to secure the samplers against gusty wind was provided.
- The distance between the HVS and any obstacles, such as buildings, was at least twice the height that the obstacle protrudes above the HVS.
- A minimum of 2 meters separation from walls, parapets and penthouses was provided for rooftop sampler.
- No furnace or incinerator flues were nearby.
- Airflow around the sampler was unrestricted.
- Permission was obtained to set up the sampler and to obtain access to the monitoring stations.
- A secure supply of electricity was obtained to operate the sampler.

Preparation of Filter papers

- Glass fibre filters, G810 were labelled and sufficient filters that were clean and without pinholes were selected.
- All filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ± 3 °C; the relative humidity (RH) was $< 50\%$ and not variable by more than $\pm 5\%$. A convenient working RH was 40%.
- *ALS Technichem (HK) Pty Ltd.* is a HOKLAS accredited laboratory which has comprehensive quality assurance and quality control programmes.

Monitoring Procedures

- The power supply was checked to ensure the HVSs work properly.
- The filter holder and the area surrounding the filter were cleaned.
- The filter holder was removed by loosening the four bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully.

- The filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter.
- The swing bolts were fastened to hold the filter holder down to the frame. The pressure applied should be sufficient to avoid air leakage at the edges.
- Then the shelter lid was closed and secured with the aluminum strip.
- The HVSs were warmed-up for about 5 minutes to establish run-temperature conditions.
- A new flowrate record sheet was set into the flow recorder.
- The flow rate of the HVS was checked and adjusted at around 1.1 m³/min. The range was between 0.6-1.7 m³/min.
- The programmable timer was set for a sampling period of 24 hrs ± 1 hr, and the starting time, weather condition and the filter number were recorded.
- The initial elapsed time was recorded.
- At the end of sampling, the sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
- It was then be placed in a clean plastic envelope and sealed.
- All monitoring information was recorded on a standard data sheet.
- Filters were sent to *ALS Technichem (HK) Pty Ltd.* for analysis.

Maintenance and Calibration

- The HVSs and their accessories were maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply.
- HVSs are calibrated at bi-monthly intervals using GMW-25 Calibration Kit throughout all stages of the impact air quality monitoring.
- Calibration details for the HVSs are provided in Appendix E.

Results and Observations

2.7 Dust monitoring was conducted for both 1-hr TSP and 24-hr TSP at all designated monitoring stations in the month. Due to power failure, 24-hr TSP monitoring at ASR17 scheduled on 16 December was postponed to 17 December. Air quality monitoring results and graphical presentations are provided in Appendix F.

1-hour TSP Monitoring

2.8 All measured 1-hour TSP levels complied with the Action and Limit Levels in the month. A summary of 1-hour TSP monitoring results is presented in Table 2.4.

TABLE 2.4 SUMMARY OF IMPACT 1-HOUR TSP MONITORING RESULTS

Monitoring Station	1-hour TSP (µg/m ³)	Action Level (µg/m ³)	Limit Level (µg/m ³)	No. of Exceedance	
	Range			Action	Limit
ASR8	34.9 – 142.5	408.1	500.0	Nil	Nil
ASR17	99.7 – 149.0	408.4	500.0	Nil	Nil

24-hour TSP Monitoring

2.9 All measured 24-hour TSP levels complied with the Action and Limit Levels in the month except at ASR17 on 4 December 2004. A summary of 24-hour TSP monitoring results is presented in Table 2.5.

TABLE 2.5 SUMMARY OF IMPACT 24-HOUR TSP MONITORING RESULTS

Monitoring Station	24-hour TSP ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)	No. of Exceedance	
	Range			Action	Limit
ASR8	61.7 – 158.3	195.0	260.0	Nil	Nil
ASR17	53.8 – 178.9	174.1	260.0	1	Nil

- 2.10 One Action Level exceedance was recorded in the month at ASR17 on 4 December 2004. Field observations indicated that fugitive dust was observed generated by traffic along the existing road only. No particular dust generating construction activities of the Project was ongoing on the monitoring day. No 24-hour TSP exceedance was recorded at ASR8 on the monitoring day and at both ASR8 and 17 on the next monitoring session on 10 December 2004. No 1-hour TSP exceedance was recorded at ASR8 and 17 on 6 December 2004. No particular observation regarding air quality was made during the weekly environmental site inspection on 1 December 2004. The exceedance recorded in the month was concluded not due to construction works of the Project.

3. NOISE

Monitoring Requirements

- 3.1 Noise levels at three designated monitoring stations were monitored in the month in accordance with the EM&A Manual. Appendix C shows the established Action and Limit Levels for the environmental monitoring works.
- 3.2 The monitoring schedule for the month is shown in Appendix D. Noise monitoring stations are shown in Figure 3.1.

Monitoring Equipment

- 3.3 Integrating Sound Level Meter was employed for noise monitoring. They were Type 1 sound level meters capable of giving a continuous readout of the noise level readings including equivalent continuous sound pressure level (L_{eq}) and percentile sound pressure level (L_x). They comply with International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1). Portable electronic wind speed indicator capable of measuring wind speed in m/s was employed to check the wind speed. Table 3.1 details the noise monitoring equipment used.

TABLE 3.1 NOISE MONITORING EQUIPMENT

Equipment	Model
Integrating Sound Level Meter	Rion NL-18/31
Calibrator	Rion NC-73

Monitoring Parameters, Frequency and Duration

- 3.4 Table 3.2 summarised the monitoring parameters, period, frequency and duration of impact noise monitoring.

TABLE 3.2 NOISE MONITORING PARAMETERS, FREQUENCY AND DURATION

Time Period	Parameters	Duration (min)	Frequency
Daytime (0700 to 1900 on normal weekdays)	L_{eq}	30	Once per week

Monitoring Locations

3.3 In accordance with the EM&A Manual, three noise monitoring stations, as shown in Figure 3.1 were selected for noise monitoring. Table 3.3 describes the location of this monitoring station.

TABLE 3.3 LOCATIONS OF NOISE MONITORING STATIONS

Monitoring Station	Identity / Description	Level
SR3	International Christian Quality Music Secondary and Primary School	Roof top level of 7 storey building
SR4	Po Leung Kuk Grandmont Primary School	Roof top level of 7 storey building
SR6	Staff Quarter for Diamond Hill Crematorium	Roof top level of 1 storey building

Monitoring Methodology

Monitoring Procedures

- The Sound Level Meter was set on a tripod at a height of 1.2 m above the ground.
- Façade measurements were made at all three monitoring locations.
- The battery condition was checked to ensure the correct functioning of the meter.
- Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:
 - frequency weighting: A
 - time weighting: Fast
 - time measurement: L_{eq} (30 minutes) during non-restricted hours i.e. between 07:00 and 19:00 on normal weekdays
- Prior to and after each noise measurement, the meter was calibrated using a Calibrator for 94 dB at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1 dB(A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- The wind speed was frequently checked with a portable wind meter.
- During the monitoring period, the L_{eq} , L_{10} and L_{90} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- Noise measurement was paused during periods of high intrusive noise (e.g. dog barking, helicopter noise) if possible. Observations were recorded when intrusive noise was unavoidable.
- Noise monitoring was cancelled in the presence of fog, rain, wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s.

Maintenance and Calibration

- The microphone head of the sound level meter and calibrator is cleaned with soft cloth at quarterly intervals.
- The meter and calibrator are sent to the supplier or HOKLAS laboratory to check and calibrate at yearly intervals.
- Calibration details for the sound level meter and calibrator are provided in Appendix E.

Results and Observations

3.4 Noise monitoring was conducted at all designated monitoring stations as scheduled in the month. Noise monitoring results and graphical presentations are provided in Appendix G.

3.5 All measured noise levels complied with the Action and Limit Levels in the month. A summary of noise monitoring results is presented in Table 3.4.

TABLE 3.4 SUMMARY OF IMPACT NOISE MONITORING RESULTS DURING 07:00 – 19:00 ON NORMAL WEEKDAYS

Monitoring Station	Measured Noise Level, dB(A) <i>L</i> _{eq} (30 min)	Calculated Construction Noise Level, dB(A)	Limit Level	No. of Exceedance	
	Average and Range	Average and Range		Action*	Limit
SR3	64.3 (62.8 – 66.5)	# (# - 60.9)	70/65##	Nil	Nil
SR4	63.7 (61.2 – 67.0)	# (# - 61.4)	70/65##	Nil	Nil
SR6	56.5 (53.6 – 59.9)	# (# - #)	75	Nil	Nil

* - Action Level is triggered by receipt of a noise complaint

- Measured noise level is less than the baseline noise level

- reduce to 70dB(A) for schools and 65dB(A) during school examination periods

4. ENVIRONMENTAL SITE INSPECTION

Site Inspections

4.1 Site inspection was carried out on a weekly basis to monitor the timely implementation of proper environmental pollution control and mitigation measures for the Project. In the month, five site inspections were carried out in the month. The summary of weekly environmental site inspections observations and environmental site inspection checklists are attached in Appendix H.

Review of Environmental Monitoring Procedures

4.2 The monitoring works conducted by the Environmental Team were inspected regularly. Observations have been recorded for the monitoring works as follows:

Air Quality Monitoring

- The monitoring team recorded the observations around the monitoring stations within and outside of the construction site.
- The monitoring team recorded the temperature and general weather condition on the monitoring day.

Noise Monitoring

- The monitoring team recorded the observations around the monitoring stations, which might affect the results.
- Major noise sources were identified and recorded.

Advice on Waste Management Status

4.3 The actual quantities of inert C&D materials and non-inert C&D wastes generated by activities of the Project in the month are provided in Table 4.1. Trip ticket system was implemented for all offsite waste disposal.

TABLE 4.1 SUMMARY OF WASTE DISPOSAL IN THE MONTH

Type of Waste Material		Disposed Quantity	Destination
Inert C&D materials		Nil	Not Applicable
Non-inert C&D waste	Metals	Nil	Not Applicable
	Paper/cardboard packaging	Nil	Not Applicable
	Plastics	Nil	Not Applicable
	Chemical waste	Nil	Not Applicable
	Others, e.g. general refuse	109m ³	SENT Landfill

Status Environmental Licences and Permits

4.4 The status of all permits/licences obtained/in-use in the month is summarised in Appendix I.

Implementation Status of Environmental Mitigation Measures

4.5 An updated summary of the Environmental Mitigation Implementation Schedule (EMIS) is presented in Appendix J.

4.6 During the weekly site inspection conducted by the Environmental Team in the month, the following observations and recommendations were made.

Water Quality

- The Contractor indicated that application for effluent discharge license was in progress.
- Surface runoff was observed. The Contractor was reminded to provide sandbags or bunds to divert the surface runoff. No surface runoff was observed by end of the month.
- Wastewater treatment facility was observed in the site. It was not installed yet. The Contractor indicated that it would be installed as soon as the drainage system was set up.

Air Quality

- Hoarding erection was observed in progress. Gap between the hoarding and the ground was observed. The Contractor was recommended to provide bunds to seal the gap between the hoarding and the ground.
- A stockpile of excavated material within the construction site was not covered. The Contractor was reminded to provide cover to the stockpile to avoid dust generation. The stockpile was partly covered with tarpaulin while the exposed surfaces were provided with water spray by end of the month. The Contractor was reminded to provide sufficient water spray to avoid dust generation by wind at nighttime.
- Construction of wheel wash bay was in progress.

Noise

- The Contractor indicated that application for construction noise permit was in progress.

Waste or Chemical Management

- The Contractor indicated that registration as a chemical waste producer was in progress.
- The Contractor would set up a Chemical Storage Area in accordance with the Waste Management Plan for Phase I Works by mid-January 2005.

Landscape and Visual

- No particular observations and recommendations were made during the weekly site inspections in the month.

Others

- Accumulation of water at the area where the temporary site office was under construction as observed in the previous month was removed.

Summary of Exceedances of Environmental Quality Performance Limit

- 4.7 The Event and Action Plans for air quality and noise are presented in Appendix K.
- 4.8 No exceedance of Action and Limit Levels for 1-hour TSP and noise levels was recorded in the month.
- 4.9 One Action Level exceedance of 24-hour TSP was recorded in the month. The exceedance recorded in the month was concluded not due to construction works of the Project.

Summary of Environmental Complaints, Notifications of Summons and Successful Prosecutions

- 4.10 Figure 4.1 presents the environmental complaint flow diagram of the Project.
- 4.11 No environmental complaint, notification of summons and prosecution was received or made against the Project in the month.

5. FUTURE KEY ISSUES

Key Issues for Coming Month

- 5.1 Key issues to be considered in the coming month include:
- Generation of dust from activities on-site;
 - Noise impact from operating equipment and machinery on-site;
 - Generation of site surface runoffs and wastewater from activities on-site;
 - Storage and disposal of general refuse and construction waste from activities on-site;
 - Management of chemicals and avoidance of oil spillage;

Environmental Monitoring and Audit Schedule for the Coming Months

- 5.2 The tentative schedules for environmental monitoring and audit for the next three months are provided in Appendix D.

6. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

- 6.1 Environmental monitoring and audit was performed in December 2004. All monitoring and audit results in the month were checked and reviewed.
- 6.2 All 1-hour TSP monitoring results recorded in the month complied with the Action and Limit Levels.
- 6.3 One Action Level exceedance of 24-hour TSP was recorded in the month. The exceedance recorded in the month was concluded not due to construction works of the Project.
- 6.4 All noise monitoring results recorded in the month complied with the Action and Limit Levels.

- 6.5 In general, the Contractor satisfactorily implemented all the required mitigation measure and was reasonably responsive to the ET's recommendations on any discrepancy observed during the weekly environmental site inspection.
- 6.6 No environmental complaint, notification summons or successful prosecution was received or made against this Project in the month

Recommendations

- 6.7 According to results of weekly environmental site inspections performed in the month and the construction programme for the coming month, recommendations for air quality, construction noise, water quality and waste and chemical management are detailed in Section 5.1.