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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 third 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 January 2005 (1 to 31 January 2005).

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

- Hoarding erection;
- Break up existing pavement and excavation;
- Draw pits and cable ducts construction;
- Underground utilities laying and backfilling;
- Tarmac and concrete road slab construction; 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	15 sessions
24-hour TSP monitoring	5 sessions
Daytime noise monitoring	4 sessions
Environmental site inspection	4 sessions

### **Breaches of Action and Limit Levels**

#### Air Quality

All 1-hour and 24-hour TSP monitoring results recorded in the month complied with the Action and Limit Levels.

#### 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三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、本報告記錄了二零零五年一月份(二零零五年一月一日至一月三十一日)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
- 建設坑道及配線管
- 鋪設地下公共事業設備及回填
- 建造柏油碎石及混凝土路面
- 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	15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	4次

## 違反監察標準

### 空氣質素

本月所有一小時與廿四小時總懸浮粒子監測結果皆符合行動水平和極限水平。

### 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 January 2005 (from 1 to 31 January 2005).

### *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:

- Hoarding erection;
- Break up existing pavement and excavation;
- Draw pits and cable ducts construction;
- Underground utilities laying and backfilling;
- Tarmac and concrete road slab construction; 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**

<b>Equipment</b>	<b>Model</b>
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**

<b>Parameter</b>	<b>Duration</b>	<b>Frequency</b>
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**

<b>Monitoring Station</b>	<b>Identity / Description</b>	<b>Level</b>
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  $\pm 3$  °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 m<sup>3</sup>/min. The range was between 0.6-1.7 m<sup>3</sup>/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. 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 <sup>3</sup> )	Action Level (µg/m <sup>3</sup> )	Limit Level (µg/m <sup>3</sup> )	No. of Exceedance	
	Range			Action	Limit
ASR8	24.1 – 206.4	408.1	500.0	Nil	Nil
ASR17	31.9 – 213.4	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. 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	75.5 – 142.9	195.0	260.0	Nil	Nil
ASR17	51.4 – 118.4	174.1	260.0	Nil	Nil

### 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**

<b>Monitoring Station</b>	<b>Identity / Description</b>	<b>Level</b>
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<sub>eq</sub></i> (30 min)	Calculated Construction Noise Level, dB(A)	Limit Level	No. of Exceedance	
	Average and Range	Average and Range		Action*	Limit
SR3	64.0 (61.3 – 68.8)	# (# - 66.4)	70/65 <sup>##</sup>	Nil	Nil
SR4	62.2 (59.0 – 67.0)	# (# - 61.4)	70/65 <sup>##</sup>	Nil	Nil
SR6	57.3 (54.9 – 58.9)	# (# - #)	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, four 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 <sup>3</sup>	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

- Construction of wheel wash bay was in progress. However, some foliage was accumulated in the bay. The Contractor was reminded to remove any materials accumulated in the wheel wash bay regularly. Foliage accumulated was removed by the next weekly site inspection.
- A drainage channel directing away from the site was observed. The Contractor was reminded to provide a trap to avoid discharge of materials through the drainage channel. Sandbags was provided by the next weekly site inspection.
- The Contractor indicated that application for effluent discharge license was in progress. Installation of wastewater treatment facility was completed.
- Exposed slopes with existing storm drains at the bottom was observed. The Contractor was recommended to provide sandbags along the existing storm drains to avoid soil and sand from entering the drains. Sandbags were provided by the next weekly site inspection.
- The Contractor was reminded to provide sandbags for the gully pit near the temporary stockpiling area to prevent surface runoff from entering the storm drains. Sandbags were provided by the next weekly site inspection.

Air Quality

- Stockpiles of excavated material were partly covered by tarpaulin. Provision of water spray to stockpiles was not observed. The Contractor indicated that the water supply within the site was damaged. The Contractor was reminded to provide dust suppression measure to stockpiles of excavated material to avoid generation of fugitive dust. Provision of water spray was observed by the next weekly site inspection and more tarpaulin sheets were provided by end of the month.
- Breaking of pavement was observed without provision of water spray. The Contractor was reminded to provide water spray to all breaking operations. Provision of water spray to pavement breaking was observed by the next weekly site inspection.

Noise

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

### Waste or Chemical Management

- Registration as a chemical waste producer was available for inspection.
- Chemical Waste Storage Area was erected by end of January 2005. The Contractor was reminded to provide a proper label in both English and Chinese. The Contractor was also recommended to erect a gate with lock.
- The Contractor was reminded to provide drip tray as temporary storage of chemical containers near the transformer room. Chemical containers were not observed near the transformer room by the next weekly site inspection.

### Landscape and Visual

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

### Others

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

### *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 and 24-hour TSP and noise levels was recorded in the month.

### *Summary of Environmental Complaints, Notifications of Summons and Successful Prosecutions*

- 4.9 Figure 4.1 presents the environmental complaint flow diagram of the Project.
- 4.10 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 January 2005. All monitoring and audit results in the month were checked and reviewed.

- 6.2 All 1-hour and 24-hour TSP monitoring results recorded in the month complied with the Action and Limit Levels.
- 6.3 All noise monitoring results recorded in the month complied with the Action and Limit Levels.
- 6.4 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.
- 6.5 No environmental complaint, notification summons or successful prosecution was received or made against this Project in the month

***Recommendations***

- 6.6 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.