

Provision of Cremators at Wo Hop Shek Crematorium

Environmental Monitoring and Audit Manual

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Environmental Monitoring and Audit Manual

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List of Abbreviations

ACM	Asbestos Containing Materials
AIR	Asbestos Investigation Report
AR	Architect's Representative
ArchSD	Architectural Services Department
ASRs	Air Sensitive Receivers
BPM	Best Practicable Means
C&D	Construction and Demolition
CAP	Contaminated Assessment Plan
CAR	Contaminated Assessment Report
CEDD	Civil, Engineering and Development Department
CNL	Corrected Noise Level
CNP	Construction Noise Permit
CWTC	Chemical Waste Treatment Centre
DCM	Dioxin Contaminated Materials
EIA	Environmental Impact Assessment
EIAO	Environmental Impact Assessment Ordinance
EIAO-TM	Technical Memorandum on Environmental Impact Assessment Ordinance
EM&A	Environmental Monitoring and Audit
EPD	Environmental Protection Department
ET	Environmental Team
ETWB	Environment, Transport and Works Bureau
FEHD	Food and Environmental Hygiene Department
HCl	Hydrogen chloride
HEPA	High Efficiency Particulate Air
Hg	Mercury
HKPSG	Hong Kong Planning Standards and Guidelines
HMCM	Heavy Metal Contaminated Materials
HOKLAS	Hong Kong Laboratory Accreditation Scheme
HTML	Hyper Text Markup Language
HVS	High Volume Sampler
IEC	Independent Environmental Checker
NCO	Noise Control Ordinance
NSRs	Noise Sensitive Receivers
PAH	Polyaromatic Hydrocarbons
PAHCM	Polyaromatic Hydrocarbons Contaminated Materials
PCB	Polychlorinated Biphenyls
PME	Powered Mechanical Equipment
ProPECC	Practice Note for Professional Persons
RAP	Remediation Action Plan
RSP	Respirable Suspended Particulates
TC	Technical Circular
TCLP	Toxicity Characteristics Leaching Procedure
TM	Technical Memorandum
TPH	Total Petroleum Hydrocarbon
TPHCM	Total Petroleum Hydrocarbon Containing Materials
TSP	Total Suspended Particulates
VSRs	Visual Sensitive Receivers
WPCO	Water Pollution Control Ordinance

1 Introduction

1.1 Background

- 1.1.1 The existing Wo Hop Shek Crematorium is a coffin crematorium with two twin cremators. A skeletal cremator building with a single cremator operates nearby for the cremation of skeletal remains from burial. The skeletal cremator and the coffin cremators were commissioned in the 1960's and 1991 respectively.
- 1.1.2 As the five existing cremators are approaching the end of their serviceable life, the Food and Environmental Hygiene Department (FEHD) proposes to demolish the existing coffin crematorium and the skeletal cremator building and to construct in-situ a new crematorium in the same site. The title of the proposed Project is "Provision of Cremators at Wo Hop Shek Crematorium" (hereafter referred to as the 'Project'). The Project location is shown in Figure 1-1.
- 1.1.3 Hyder Consulting Limited has been appointed by the Architectural Services Department (ArchSD) as the Consultant to undertake the Environmental Impact Assessment (EIA) for this Project.
- 1.1.4 The construction phase will be divided in the three phases outlined below:

Phase I (Year 2009 to Year 2011)

- 1.1.5 Construction works include the demolition of the existing coffin crematorium building, transformer room and pump room and provision of five new coffin cremators, one dual-purpose cremator, one new skeletal cremator, one cremation plant room with sufficient space for housing nine single cremators and other ancillary facilities such as service halls. The new crematorium will provide seven cremators upon completion of Phase I.

Phase II (Year 2012)

- 1.1.6 The existing skeletal cremator building will be demolished upon completion of Phase I (i.e. there will be no overlapping between Phases I and II).

Phase III: Future Expansion Phase (for completion by around 2014)

- 1.1.7 Two additional cremators and one additional service hall will be provided upon completion of Phase II to allow future expansion.

1.2 Purpose of the Manual

- 1.2.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual (hereafter refer to as the "Manual") is to guide the set up of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the

monitoring and audit programme for the construction phase of the Project. It aims to provide systematic procedures for monitoring, auditing and minimising environmental impacts associated with construction works and operational activities.

1.2.2 Hong Kong environmental regulations, the *Hong Kong Planning Standards and Guidelines* (HKPSG) and recommendations in the EIA Report for the Project have served as environmental standards and guidelines in the preparation of this Manual. In addition, the EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the *Technical Memorandum on the EIA Process* (EIAO-TM).

1.2.3 This Manual contains the following information:

- Responsibilities of the Contractor, the Architect's Representative (AR), the Environmental Team (ET) and the Independent Environmental Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the Project;
- Project organisation for the Project;
- The basis for, and description of the broad approach underlying the EM&A programme;
- Requirements with respect to the construction schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
- Details of the methodologies to be adopted, including all field laboratories and analytical procedures, and details on quality assurance and quality control programme;
- The rationale on which the environmental monitoring data will be evaluated and interpreted;
- Definition of Action and Limit levels;
- Establishment of Event and Action Plans;
- Requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints;
- Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures;
- Requirements for review of EIA predictions and the effectiveness of the mitigation measures / environmental management systems and the EM&A programme.

1.2.4 For the purpose of this manual, the ET Leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the EM&A requirements.

1.3 Environmental Monitoring and Audit Requirements

- 1.3.1 Any potential impacts from the construction and operation phases have been assessed and presented in the EIA Report. The EIA Report has specified the recommended environmental mitigation measures to minimise any potential adverse environmental impacts identified. An implementation schedule of the recommended environmental mitigation measures is prepared as part of the EIA study and is summarised in Appendix A Environmental Mitigation Implementation Schedule of this Manual.
- 1.3.2 To ensure that the mitigation measures recommended in the EIA study are implemented fully and resulted in the expected effectiveness, this Manual defines the scope of EM&A requirements for the construction and operation of the Project to achieve satisfactory environmental performance. The EM&A requirements for the Project shall be as follows:
- Pre-Construction Phase – conduct baseline monitoring prior to any Project activity occurring on site;
 - Construction Phase – conduct impact / compliance monitoring and environmental audit during all construction activities; and
 - Operation Phase – conduct air quality monitoring during the operation of the new crematorium.
- 1.3.3 The environmental monitoring programme shall also be assessed by regular environmental audit. This aims to determine whether satisfactory compliance with the legislative requirements has been met, and to ensure that no impact is being caused to sensitive receivers. If impact is being caused, the remedial action plan will be initiated, if required. This shall require information on the standards for parameters of concern and monitoring data. The environmental audit shall review the monitoring data and compare the audit conditions with the relevant legislative requirements and environmental performance standards specified in the Contract Document.

1.4 Project Organisation

- 1.4.1 The proposed Project organisation and lines of communication with respect to environmental protection works for designated project are shown in Appendix B.
- 1.4.2 The ET Leader and the ET shall be an independent party from the Contractor. The ET shall be led and managed by the ET Leader who shall be the person having at least 7 years experience in EM&A or environmental management. The IEC shall have the same experience and professional qualifications as stipulated above for the ET Leader.
- 1.4.3 The responsibility of respective parties are:

The Contractor

- Employ an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit;
- Provide information / advice to the ET regarding works activities which may contribute, or be continuing to the generation of adverse environmental conditions;
- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans;
- Implement measures to reduce impact whenever Action and Limit levels are exceeded;
- Implement the corrective actions instructed by the Engineer;
- Accompany joint site audit undertaken by the ET; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 9.3 of this Manual.

Environmental Team

- Monitor various environmental parameters as required in the EM&A Manual;
- Analyse the environmental monitoring and audit data and review the success of EM&A programme to cost-effectively confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
- Carry out site audit to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems;
- Audit and prepare audit reports on the environmental monitoring data and site environmental conditions;
- Report on the environmental monitoring and audit results to the IEC the Contractor, the AR and the Environmental Protection Department (EPD) or its delegated representative;
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 9.3 of this Manual.

Architect's Representative

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans;
- Participate in joint site audit undertaken by the ET;
- Employ an IEC to audit the results of the EM&A works carried out by the ET; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 9.3 of this Manual.

Independent Environmental Checker

- Review the EM&A works performed by the ET (at not less than monthly intervals);
- Audit the monitoring activities and results (at not less than monthly intervals);
- Report the audit results to the AR and EPD in parallel;
- Review the EM&A reports (monthly and quarterly summary reports) submitted by the ET;
- Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans; and
- Adhere to the procedures for carrying out complaint investigation in accordance with Section 9.3 of this Manual.

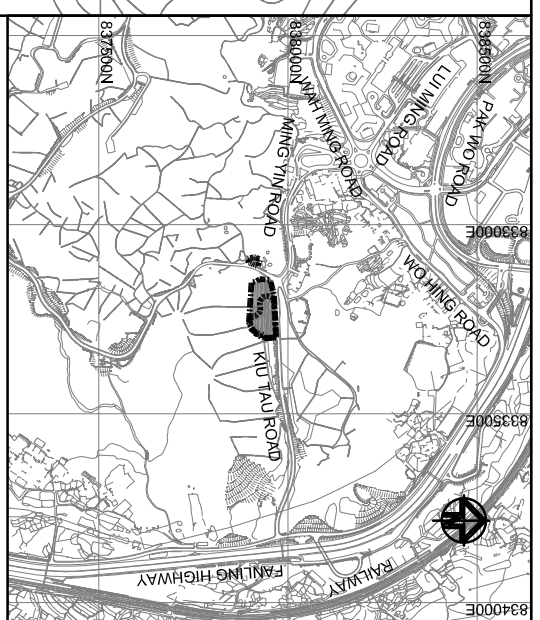
- 1.4.4 Sufficient and suitably qualified professional and technical staff should be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the Project.

1.5 Structure of the Manual

- 1.5.1 Following this introductory section, this Manual is set out as follows:

Section 2	Describes details of baseline, impact and operation phase monitoring of air quality; Action and Limit levels; and contingency procedures.
Sections 3 to 7	Describe proper management practices for noise, land contamination, waste management, landscape and visual, and water quality.
Section 8	Describes impact monitoring and mitigation measures on ecology.

- Section 9 Describes the scope, approach and frequency of site audit.
- Section 10 Describes the reporting requirements, data keeping requirements, electronic reporting of EM&A information as well as the procedures of the issue of Notification of Exceedances to relevant parties in case exceedance in the measurement result is recorded.



LEGEND:

- SITE BOUNDARY OF NEW CREMATORIUM
- EXISTING SITE BOUNDARY OF COFFIN CREMATORIUM
- - - - SITE BOUNDARY OF SKELETAL CREMATOR BUILDING

Issue	Description	Date
01	FIRST ISSUE	01DEC06

Status: **PRELIMINARY**
 NOT TO BE USED FOR CONSTRUCTION

Original Size	A3	Checker	C. NG
Height	DATUM	Approver	C. NG
Grid	GRID	© Copyright reserved	

Client: 1256-FIG_1-1.DWG

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Project: PROVISION OF CREMATORS AT WU HOP SHEK CREMATORIUM

Title: LOCATION PLAN

Figure No.	1-1	Issue	-
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2 Air Quality

2.1 Air Quality Monitoring Parameters

- 2.1.1 The air quality impact assessment indicates that there would be construction dust impact during the construction phases of the Project, if dust control measures (i.e. water spraying) is not implemented properly. EM&A of air quality during the construction phase is recommended.
- 2.1.2 Monitoring of the Total Suspended Particulates (TSP) levels shall be carried out by the ET during the construction phase in order to ensure that any deteriorating air quality can be readily detected and timely action taken to rectify the situation.
- 2.1.3 TSP levels in 1-hour and 24-hour shall be measured to indicate the impacts of construction dust on air quality. TSP levels shall be measured by following the standard high volume sampling (HVS) method as set out in the *Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B*. Upon approval of the AR and the IEC, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.
- 2.1.4 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena and work progress of the concerned site etc. shall be recorded down in details. A sample field log sheet is shown in Appendix C to this Manual.

2.2 Monitoring Equipment

- 2.2.1 High Volume Sampler (HVS) in compliance with the following specifications shall be used for carrying out the 1-hour and 24-hour TSP monitoring:
- 0.6-1.7 m³/min (20-60 SCFM) adjustable flow range;
 - Equipped with a timing / control device with ± 5 minutes accuracy for 24 hours operation;
 - Installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
 - Capable of providing a minimum exposed area of 406 cm² (63 in²);
 - Flow control accuracy: $\pm 2.5\%$ deviation over 24-hour sampling period;
 - Equipped with a shelter to protect the filter and sampler;
 - Incorporated with an electronic mass flow rate controller or other equivalent devices;
 - Equipped with a flow recorder for continuous monitoring;
 - Provided with a peaked roof inlet;
 - Incorporated with a manometer;

- Able to hold and seal the filter paper to the sampler housing at horizontal position;
 - Easy to change the filter; and
 - Capable of operating continuously for 24-hour period.
- 2.2.2 The ET Leader shall be responsible for provision of the monitoring equipment and associated power supply. The ET Leader shall ensure that sufficient numbers of HVSs with an appropriate calibration kit are available for carrying out the regular impact monitoring and ad hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc. shall be clearly labelled. The ET Leader shall also liaise with the concerned parties for gaining access to the monitoring stations for the installation of the monitoring equipment and carrying out the monitoring.
- 2.2.3 The flow rate of each HVS with mass flow controller shall be calibrated using an orifice calibrator. Initial calibration of dust monitoring equipment shall be conducted upon installation and prior to commissioning. One point flow rate calibration shall be carried out every two months. Five-point calibration shall be carried out every six months.
- 2.2.4 The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by concerned parties, such as the IEC. All the data shall be converted into standard temperature and pressure conditions.
- 2.2.5 If the ET Leader proposes to use a direct reading dust meter to measure 1-hour TSP levels, he shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that of HVS. The instrument shall also be calibrated regularly, and the 1-hour TSP sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.
- 2.2.6 Wind data monitoring equipment shall also be provided and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall be proposed by the ET Leader and agreed with the AR in consultation with the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:
- The wind sensors shall be installed on masts at an elevated level 10m above ground so that they are clear of obstructions of turbulence caused by the buildings;
 - The wind data shall be captured by a data logger and to be downloaded for processing at least once a month;
 - The wind data monitoring equipment shall be re-calibrated at least once every six months; and
 - Wind direction shall be divided into 16 sectors of 22.5 degrees each.

- 2.2.7 In exceptional situations, the ET Leader may propose alternative methods to obtain representative wind data from the IEC and the AR, and agreement from the IEC.

2.3 Laboratory Measurement / Analysis

- 2.3.1 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, shall be made available for sample analysis, and equipment calibration and maintenance. The laboratory is preferably Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited.
- 2.3.2 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment and measurement procedures shall meet with the satisfaction of the AR in consultation with the IEC. The ET Leader shall provide the AR with one copy of the *Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50)*, Appendix B for his reference.
- 2.3.3 Filter paper of size 8"×10" shall be labelled before sampling. It shall be a clean filter paper with no pin holes, and shall be conditioned in a humidity controlled chamber for over 24-hour and be pre-weighed before use for the sampling.
- 2.3.4 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic bag. The filter paper is then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.
- 2.3.5 All the collected samples shall be kept in a good condition for 6 months before disposal.

2.4 Monitoring Locations

- 2.4.1 Two designated monitoring stations, namely A22a and A22b, are selected for 1-hour and 24-hour TSP monitoring. Table 2-1 describes the air quality monitoring locations, which are also depicted in Figure 2-1.

Air Monitoring Location ID	Location
A22a	Wo Hop Shek San Tsuen
A22b	Wo Hop Shek San Tsuen

Table 2-1 Air Quality Monitoring Locations

- 2.4.2 The status and locations of dust sensitive receivers may change after issuing this Manual. If such cases exist, the ET Leader shall propose updated monitoring locations and seek approval from the AR and the IEC and agreement from EPD on the proposal.

- 2.4.3 When alternative monitoring locations are proposed, the following criteria for the proposed locations, as far as practicable, shall be followed:
- To be located at the site boundary or such locations close to the major dust emission source;
 - To be located close to the sensitive receivers; and
 - Take into account the prevailing meteorological conditions.
- 2.4.4 The ET Leader shall agree with the AR on the position of the HVS for installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:
- A horizontal platform shall be provided with appropriate support to secure the samplers against gusty wind;
 - No two samplers shall be placed less than two metres apart;
 - The distance between the sampler and an obstacle, such as buildings, shall be at least twice the height that the obstacle protrudes above the sampler;
 - A minimum of two meters of separation from walls, parapets and other structures is required for rooftop samples;
 - A minimum of two meters separation from any supporting structure, measured horizontally is required;
 - No furnaces or incineration flues are nearby;
 - Airflow around the sampler is unrestricted;
 - The sampler is more than 20 meters from any drip line;
 - Any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;
 - Permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
 - A secured supply of electricity is needed to operate the samplers.

2.5 Baseline Monitoring

- 2.5.1 Baseline monitoring shall be carried out at all the designated monitoring locations for at least 14 consecutive days prior to the commencement of the major construction works to obtain daily 24-hour TSP samples. 1-hour TSP sampling shall also be done at least three times per day while highest dust impact is expected. Before commencing the baseline monitoring, the ET Leader shall submit the baseline monitoring programme to the AR and the IEC for approval.
- 2.5.2 During the baseline monitoring, there shall not be any construction or dust generation activities from the Project in the vicinity of the monitoring stations.
- 2.5.3 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader

shall propose alternative monitoring locations that can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved by the AR and agreed with the IEC.

- 2.5.4 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to AR and IEC for approval.
- 2.5.5 Ambient conditions may vary seasonally and shall be reviewed at six monthly intervals. If the ET Leader considers that the ambient conditions have been changed and baseline levels need to be updated by means of a repeat of the baseline monitoring. The monitoring shall be conducted at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should changes in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, shall be revised. The revised baseline levels and air quality criteria shall be agreed with the IEC and EPD.

2.6 Impact Monitoring

- 2.6.1 The ET Leader shall carry out impact monitoring during the course of the construction phase of the Project. Regular impact monitoring consists of three sets of 1-hour TSP and one set of 24-hour TSP sampling once every six days during the time when the highest dust impact occurs. The specific time to start and stop the 24-hr TSP monitoring shall be clearly defined for each location and shall be strictly followed.
- 2.6.2 In case of non-compliance with the air quality criteria, more frequent monitoring shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality caused by the Project is rectified.

2.7 Event and Action Plan for Air Quality

- 2.7.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET Leader shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP and 24-hour TSP. Table 2-2, below, shows the Action and Limit levels to be used. Should non-compliance of the air quality criteria occur, actions in accordance with the Event and Action Plan in Table 2-3 shall be carried out.

Parameters	Action Level	Limit Level
24-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 200 \mu\text{g}/\text{m}^3$, Action level = (average of baseline level * 1.3 + Limit level)/2 For baseline level $> 200 \mu\text{g}/\text{m}^3$, Action level = Limit level	260
1-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$, Action level = (average of baseline level * 1.3 + Limit level)/2 For baseline level $> 384 \mu\text{g}/\text{m}^3$, Action level = Limit level	500

Table 2-2 Action and Limit Levels for Air Quality

Event	Action			
	ET	IEC	AR	Contractor
Action Level				
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of complaint and propose remedial measures; 2. Inform IEC and AR; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method. 	<ol style="list-style-type: none"> 1. Notify Contractor. 	<ol style="list-style-type: none"> 1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Identify source; 2. Inform IEC and AR; 3. Advise the AR on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with IEC and AR; 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ET on the effectiveness of the proposed remedial measures; 5. Supervise Implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Submit proposals for remedial to AR within three working days of notification; 2. Implement the agreed proposals; 3. Amend proposal if appropriate.

Event	Action			
	ET	IEC	AR	Contractor
Limit Level				
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform IEC, AR, Contractor and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and AR informed of the results. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the AR on the effectiveness of the proposed remedial measures; 5. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Notify IEC, AR, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and 	<ol style="list-style-type: none"> 1. Discuss amongst AR, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the AR accordingly; 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Ensure remedial measures properly implemented; 5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within three 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 the AR until the exceedance is abated.

Event	Action			
	ET	IEC	AR	Contractor
	AR to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and AR informed of the results; 8. If exceedance stops, cease additional monitoring.		that portion of work until the exceedance is abated.	

Table 2-3 Event and Action Plan for Air Quality

2.8 Operation monitoring

- 2.8.1 During the operation of the new crematorium, chimney emission is anticipated to be the major environmental concern. Respirable Suspended Particulates (RSP), carbon monoxide (CO), hydrogen chloride (HCl), mercury (Hg), organic compounds and dioxins may be generated from the cremation process. The cremators in the new crematorium shall be equipped with the latest technology flue gas filtering and emission monitoring system that meets the emission requirements stipulated in “A Guidance Note on the Best Practicable Means for Incinerators (Crematoria) BPM12/2 (September 2006)” (BPM12/2). The results of air quality impact assessment reveal that the air quality at the nearby Air Sensitive Receivers (ASRs) will be in compliance with the relevant air quality guidelines and there will be no odour nuisance from the new Crematorium. Furthermore, by limiting joss paper burning activities through administration procedures, nuisance arising from joss paper burning is anticipated to be negligible.
- 2.8.2 To ensure compliance with legislation, the conditions and the continuous monitoring stipulated in BPM12/2 shall be carried out.
- 2.8.3 Necessary monitoring equipment and techniques shall be provided and used to demonstrate that the process is properly operated and the emissions meet the air pollution control requirements. The scope, manner and frequency of the monitoring shall be sufficient for this purpose and shall be determined by EPD. Monitoring results shall be recorded in a manner specified by EPD. The record shall be retained at the premises for a minimum of two years, or other period specified by EPD, after the date of last entry and be made available for examination as and when required by EPD.
- 2.8.4 The following parameters shall be monitored and recorded continuously or periodically:

Process and Waste Gas Continuous Monitoring

- Temperature inside the primary combustion zone;
- Temperature and oxygen content of the gas at the appropriate location(s) to demonstrate that the requirements set out in the paragraphs 4.2.2 to 4.2.3 of BPM12/2 can be complied with;
- Carbon monoxide concentration at the outlet from the secondary combustion zone;
- Gas opacity at the chimney of the cremator; and
- Other essential operating parameter(s) that may affect the performance of air pollution control measures.

On-line Monitoring

- The continuous monitoring data referred above shall be transmitted instantaneously to EPD by telemetry system or the real time and logged monitoring data shall be accessible by EPD in such manner and format agreed with EPD.

Periodic Measurement

- Periodic measurements of particulates, HCl, CO, gaseous and vaporous organic substances, Hg and dioxins shall be made to confirm the compliance with the emission limits set out in Annex I of BPM12/2. The sampling frequency shall be determined by EPD. All measurement results shall be recorded, processed and presented in a summary report as agreed by EPD. The report shall be submitted to EPD within reasonable time(s) to be agreed with EPD after the source sampling(s) as required is / are completed.
- 2.8.5 The monitoring equipment to be used shall meet the specifications specified by EPD. They shall be maintained and calibrated according to the manufacturer's recommendations. Unless otherwise agreed by EPD, zero and span checks shall be carried out every 24 hours and recorded. Regular quality control check on the continuous emission monitoring equipment in every six months shall also be conducted.
- 2.8.6 The instruments for gas opacity monitoring shall be fitted with audible and visual alarms which shall activate at a trigger level agreed with EPD. Emission events which lead to the alarms being activated shall be properly recorded in such manner and format agreed with EPD. These instruments shall be checked regularly to ensure that they are functioning correctly in accordance with the manufacturer's instructions.
- 2.8.7 Smoke emission from cremator during the normal operations (including start-up and shut down) shall not, when compared in the appropriate manner with the Ringlemann Chart or an approved device, appear to be as dark as or darker than Shade 1 on the Ringlemann Chart.
- 2.8.8 The monitoring of the above air pollutants shall comply with the requirements of BPM and the future Specified Process License of the New Crematorium, to be issued by EPD under the APCO.

2.9 Mitigation Measures

Construction Phase

- 2.9.1 The following mitigation measures shall be implemented for the construction phase:

Site Boundary and Entrance

- Vehicle washing facilities including a high pressure water jet shall be provided at every designated vehicle exit point; and
- The area at which vehicle washing takes place and the section of the road between the washing facilities and the exit point shall be paved with concrete, bituminous or hardcore material.

Access Haul Roads and Unpaved Areas

- Each and every main haul road shall be paved with concrete, bituminous hardcore materials or metal plates, and kept clear of dusty materials; and
- Unpaved haul roads and areas shall be sprayed with water so as to keep the entire road surface wet.

Excavated Materials

- Any stockpile of dusty material shall be either: (a) covered entirely by impervious sheeting; (b) placed in an area sheltered on the top and the three sides; or (c) sprayed with water or a dust suppression chemical so as to maintain the entire surface wet.

Exposed Earth

- Exposed earth shall be properly treated by compaction, hydroseeding, vegetation planting or seeding with latex, vinyl, bitumen within six months after the last construction activity on the site or part of the site where the exposed earth lies.

Loading, Unloading or Transfer of Dusty Materials

- All dusty materials shall be sprayed with water immediately prior to any loading or transfer operation so as to keep the dusty material wet.

Debris Handling

- Any debris shall be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the three sides; and
- Before debris is dumped into a chute, water shall be sprayed so that it remains wet when it is dumped.

Transport of Dusty Materials

- Vehicles used for transporting dusty materials / spoils shall be covered with tarpaulin or similar material. The cover shall extend over the edges of the sides and tailboards.

Site Clearance

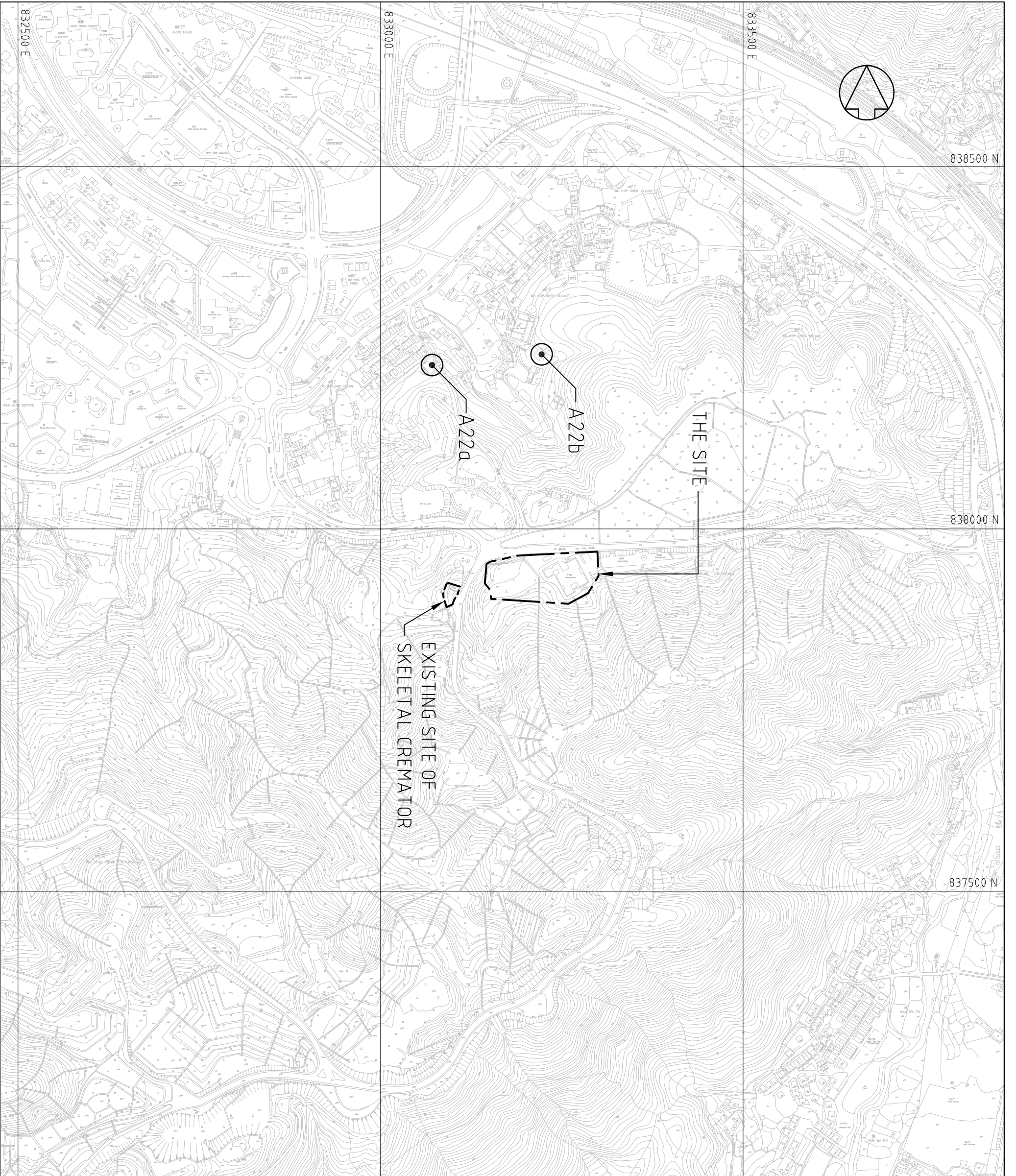
- The working area for the uprooting of trees, shrubs, or vegetation or the removal of boulders, pole, pillars shall be sprayed with water immediately before, during and immediately after the operation so as to maintain the entire surface wet; and
- All demolished items shall be covered by impervious sheeting or placed in a spot with shelters on top and three sides within a day of the demolition.

2.9.2 Workers at all levels shall be co-operative to avoid dust generation and dispersion to the surrounding environment.

2.9.3 During demolition of the existing crematorium and existing skeletal cremator building, special attention shall be given to the interior deposition of the chimneys, flue gas piping and cremation chambers. Special demolition and handling methods for the contaminated materials shall be adopted to avoid fugitive emission of dioxins and toxic air pollutants.

Operation Phase

- 2.9.4 The cremators of equivalent specifications equipped with the latest technological flue gas filtering and emission monitoring system that meet the BPM12/2 emission requirements shall be adopted for the Project. Moreover, proper operation and maintenance of the new crematorium and air pollution control unit of the cremators shall be ensured in order to avoid any uncontrolled emissions due to malfunctioning of the cremator or air pollution control unit.



LEGEND :

ID	Name of Air Quality Monitoring Station
A22a	Wo Hop Shek San Tsuen
A22b	Wo Hop Shek San Tsuen

Issue	Description	Date

Scale	Current Issue Signatures
1 : 5000	Author
Original Size	Checker
Height	Approver
Datum	
Grid	© Copyright reserved

Filename: 1256-GA-LP-001DWG
Client:



ARCHITECTURAL SERVICES DEPARTMENT



HYDER CONSULTING LIMITED
47/F Hopewell Centre
183 Queen's Road East
Wai Tai
Hong Kong
Tel: (852) 2911 2233
Fax: (852) 2805 5028

Project
PROVISION OF CREMATORIUMS
AT WO HOP SHEK CREMATORIUM

Title
LOCATIONS OF AIR QUALITY
MONITORING STATIONS

Drawing No. FIGURE 2-1
Issue

3 Noise

3.1 Introduction

- 3.1.1 The noise assessment indicated that no adverse noise impacts are expected from either the construction and operation phases of the Project for existing NSRs. There is only exceedance to daytime noise criterion during examination periods for educational institutions should the G/IC zone at NSR2 developed into educational institutions. Use of quiet plant is recommended as the mitigation measure. The unmitigated noise levels during operation phase comply with the relevant noise criteria for all NSRs. Other environmental mitigation measures including good site practice and proper maintenance of Powered Mechanical Equipment (PME), as recommended in the EIA Report and Section 3.2 of this Manual, shall be undertaken to further minimise any potential noise impacts from the Project.
- 3.1.2 Regular site audit, outlined in Section 9 of this Manual, will serve to inspect the implementation status of the mitigation measures cater for any potential noise impacts.

3.2 Mitigation Measures

Construction Phase

- 3.2.1 Good site practice and noise management shall readily be applied to achieve additional reduction to construction noise emissions from daytime construction.

Good Site Practice

- Only well-maintained plant should be operated on site and the plant should be regularly serviced during the construction works;
 - Plant that is used intermittently, should be turned off or throttled down when not in active use;
 - Plant that is known to emit noise strongly in one direction should be oriented to face away from NSRs;
 - Silencers, mufflers and enclosures for plant should be used where possible and maintained adequately throughout the works;
 - Where possible mobile plant should be sited away from NSRs; and
 - Stockpiles of excavated materials and other structures such as site buildings should be used effectively to screen noise from the works.
- 3.2.2 Inadequate maintenance and improper use of the PME will result in a deterioration of the plant performance and will generate excessive noise. It is

the Contractor's responsibility to maintain and to ensure good performance of the PME.

Use of Quiet Plant

- 3.2.3 Use of quiet plants is recommended as the mitigation measure during examination periods of the educational institutions for demolition and site formation of Phase I and demolition of Phase II should the G/IC zone at NSR2 developed into educational institutions.

Operation Phase

- 3.2.4 Although it is not anticipated that the NSRs will be impacted by operation noise from the new crematorium, noise from fixed-noise sources can be further reduced by locating them as far as practical from the NSRs within the Site, and / or by orientating the noise emission points away from the NSRs, and / or by the application of silencers, acoustic barriers or enclosures to the concerned equipment.

4 Land Contamination

4.1 Further Site Investigations

- 4.1.1 Further site investigations for areas that are currently in use or cannot presently be accessed until after decommissioning of the existing crematorium are recommended. These areas include the transformer room, dangerous goods stores, day tank room, fuel pump room, sunken fuel pipe and cremator.
- 4.1.2 Potential contaminants in the soils have been identified in CAR. Thus the parameters to be analysed for the soils at different locations are summarised in Table 4-1.

Location	Parameters
Existing Crematorium	
Underground fuel tank (underneath the tank)	<ul style="list-style-type: none"> ▪ TPH ▪ PAH
Dangerous goods store	<ul style="list-style-type: none"> ▪ TPH ▪ PAH
Daily tank room, fuel pump room and sunken fuel pipe	<ul style="list-style-type: none"> ▪ TPH ▪ PAH
Cremators (residual inside the cremator, flue and chimneys)	<ul style="list-style-type: none"> ▪ PAH ▪ Dioxins ▪ Metals (Cr, Co, Ni, Cu, Zn, As, Mo, Cd, Sn, Ba, Hg, Pb)
Transformer room	<ul style="list-style-type: none"> ▪ Polychlorinated Biphenyls (PCB)
Skeletal Cremator Building	
Underground fuel tank (underneath the tank)	<ul style="list-style-type: none"> ▪ TPH ▪ PAH
Dangerous goods store	<ul style="list-style-type: none"> ▪ TPH ▪ PAH
Cremator (residual inside the cremator, flue and chimneys)	<ul style="list-style-type: none"> ▪ PAH ▪ Dioxins ▪ Metals (Cr, Co, Ni, Cu, Zn, As, Mo, Cd, Sn, Ba, Hg, Pb)

Table 4-1 Testing Parameters for Future Site Investigation

- 4.1.3 In accordance with the Interim CAR and Practice Note for Professional Persons (ProPECC) PN 3/94 "Contaminated Land Assessment and Remediation", the Dutch A, B, C Classification system was used as the

assessment criteria for the interpretation of analytical results of soil and groundwater samples.

- 4.1.4 The underground fuel tanks will be removed during the demolition phase of the Project. After removal of the underground fuel tank, confirmatory soil samples should be collected and tested in accordance with Section 5.7.6 of the EIA Report to ensure that no contamination due to fuel leakage.
- 4.1.5 The new EPD Guidance Note for Contaminated Land Assessment and Remediation and RBRGs for soil and groundwater contamination assessment shall be adopted for any further site investigation to determine the extent, level, and necessity of soil or groundwater remediation works.
- 4.1.6 If soil contamination is identified, the extent of contamination shall be confirmed. Contaminated soil shall be removed or treated. Confirmatory soil sampling shall be carried out during the remediation works. It shall consist of five to six samples in each of the location of where soil contamination is identified from site investigation works. The locations shall be located to the north, south, east and west of the location where contaminated soil is found. Two locations shall also be above and below the depth where contaminated soil is found. If analytical results exceed Dutch B Levels or other agreed remedial target suggested in a supplementary CAR, such as RBRGs, the contamination area shall be extended and further confirmatory sampling shall be carried out until no further contamination is encountered.
- 4.1.7 All further site investigations shall be carried out after the decommissioning of the existing crematorium and skeletal cremator building. Sampling and analysis plans for these investigations shall be prepared and submitted to EPD for approval prior to any of these investigation works. Supplementary CAR and RAP shall be prepared to detail the results and findings of these site investigations and, if any, necessary remedial works. Further site investigations shall be conducted by the demolition contractor.

5 Waste Management

5.1 Introduction

- 5.1.1 Wastes likely to be generated during the construction phase of the Project include excavated material; construction and demolition materials; contaminated materials including ash waste and building structures (containing asbestos, dioxin, heavy metals, PAH, TPH and PCB); chemical waste and general refuse.
- 5.1.2 During the operation phase of the new crematorium, the major types of waste expected to be generated are ash and non-combustible residues generated from the cremators during the combustion process; chemical waste generated from the air pollution control system and machinery maintenance and servicing; and general refuse generated by the visitors and staff during daily operation.
- 5.1.3 Since the existing crematorium is still in operation, further contamination investigation in the site areas currently inaccessible is recommended. This investigation should occur after decommissioning but prior to demolition of the Existing Crematorium to confirm the quality and quantity of ash waste and building structures requiring treatment and disposal.
- 5.1.4 If good site practices are strictly followed, it is expected that adverse environmental impacts due to waste generation will not arise. Good management and control can prevent the generation of significant amounts of waste. In addition, specific mitigation measures are recommended to minimise environmental impacts during handling, transportation and disposal of wastes generated from the Project. The environmental mitigation measures for waste management during the construction phase as well as during the operation phase are summarised in the following sections.
- 5.1.5 Site Audit has been recommended during the construction phase. The EIA Study has determined that with effective implementation of the appropriate mitigation measures, there will be no significant impact from these wastes.

5.2 Mitigation Measures

Construction Phase

Good Site Practice and Waste Reduction Measures

- 5.2.1 The following good site practices shall be included in the Contract documents for the Project to minimise waste management impacts:
- Obtain the necessary waste disposal permits from the appropriate authorities, in accordance with the *Waste Disposal Ordinance (Cap. 354)*,

Waste Disposal (Chemical Waste) (General) Regulation and the Land (Miscellaneous Provision) Ordinance (Cap. 28);

- Obtain a billing account with EPD for disposal of construction waste (*Waste Disposal (Changes for Disposal of Construction Waste) Regulation*).
- A Waste Management Plan (WMP), incorporated within an Environmental Management Plan (EMP), shall be prepared and submitted to the Engineer/Supervising Officer for approval. Reference shall be made to *Environment, Transport and Works Bureau Technical Circular (Works) (ETWB TCW) 19/2005*.
- Nomination of an approved person to be responsible for good site practice shall take place along with arrangements for collection and effective disposal of all wastes generated at the site to an appropriate facility;
- Use of a waste haulier authorised or licensed to collect specific category of waste;
- A trip-ticket system should be included as one of the contractual requirements and implemented by the ET to monitor the disposal of construction and demolition (C&D) material at public filling facilities and landfills, and to prevent fly tipping. Reference shall be made to *ETWB TCW No. 31/2004*.
- Training of site personnel in proper waste management and chemical waste handling procedures;
- Separation of chemical wastes for special handling and appropriate treatment at a licensed facility;
- Routine cleaning and maintenance programme for drainage systems, sumps and oil interceptors;
- Provision of sufficient waste disposal points and regular collection for disposal;
- Adoption of appropriate measures to minimise windblown litter and dust during transportation of waste, such as covering trucks or transporting wastes in enclosed containers;
- Implementation of a recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites).

5.2.2 Good management and control can prevent the generation of significant amounts of waste. Inclusion of the following practices in the Contract documents is recommended to ensure waste reduction:

- Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal;
- Encourage collection of aluminium cans, plastic bottles and packaging material (e.g. carton boxes) and office paper by individual collectors. Separate labelled bins should be provided to help segregate this waste from other general refuse generated by the work force;

- Any unused chemicals or those with remaining functional capacity should be reused as far as practicable;
- Reuse C&D materials when possible to reduce the amount of C&D material/waste;
- Wood, steel and other metals should be separated for reuse and / or recycling prior to disposal as C&D waste at landfill;
- Minimise the potential for damage or contamination of construction material by having proper storage and site practices;
- Plan and stock construction materials carefully to minimise the amount of surplus materials.

5.2.3 In addition to the above good site practices and waste reduction measures, specific mitigation measures are recommended below to minimise environmental impacts during handling, transportation and disposal of wastes generated from the Project.

Excavated Materials

5.2.4 Rock and soil generated from excavation shall be reused for site formation and excavated material from foundation work reused for landscaping as far as practicable to avoid disposal off-site. It is envisaged that no surplus of excavated materials will be generated for disposal from the Project aside of any unsuitable materials, such as asbestos and unless significant volumes of contaminated soils are detected.

Construction and Demolition Materials

5.2.5 Reuse of public fill and C&D waste shall be practiced on site as far as practicable.

5.2.6 The handling of C&D materials is governed by *Works Branch Technical Circular No. 2/93, Public Dumps*. Inert C&D material (public fill) shall be directed to an approved public filling area or reclamation site.

5.2.7 The *Land (Miscellaneous Provision) Ordinance* requires that individuals or companies who deliver public fill to public filling areas require dumping licences. The Civil Engineering and Development Department (CEDD) under delegated powers from the Director of Lands issue these licenses.

5.2.8 Careful design, planning and good site management can minimise over-ordering and generation of materials, such as concrete, mortar and cement grouts. The design of formwork should maximise the use of standard wooden or metal panels so that high reuse levels can be achieved. Alternatives such as steel formwork, plastic fencing and reusable site office structures shall be considered to increase the potential for reuse and minimise C&D waste generation.

5.2.9 The Contractor shall use as much of the C&D material as possible on-site. Proper segregation of waste types on site will increase the feasibility of certain components of the waste stream by recycling contractors.

Contaminated Materials

- 5.2.10 After decommissioning, but prior to demolition, of the existing crematorium, further contamination investigation should be carried out to confirm the composition and quantity of ash waste and any building structures requiring treatment and disposal. Future contamination investigation requirements are summarised in Table 5-1 and described below.

Location	Investigation Parameter	Investigation Period	Responsible Party
Cremators/flue/chimney and surrounding areas	Asbestos (building structures)	After decommissioning but prior to demolition of the existing crematorium	Contractor
Cremators/flue/chimney and surrounding areas	Dioxins, heavy metals, PAH (ash waste)		

Table 5-1 Future Contamination Investigation Requirements

- 5.2.11 The incense burner, coffin and skeletal crematorium were still operational during the asbestos assessment and could not be adequately inspected or sampled. These areas contain materials suspected to contain asbestos containing materials (ACM) and are detailed in the Asbestos Investigation Report (AIR) (as shown in Annex 3-i of the EIA Report).
- 5.2.12 Prior to any demolition work commencing, areas suspected to contain ACM shall be further inspected by a registered asbestos consultant to determine the presence of any ACM. These areas shall be thoroughly investigated and the additional findings submitted as supplementary information to the AIR.
- 5.2.13 Samples shall be analysed for the presence and type of asbestos according to testing procedures of a HOKLAS-accredited laboratory. If the findings of the investigation indicate ACM materials present on the premises an Asbestos Abatement Plan must be prepared prior to commencement of demolition works.
- 5.2.14 It is not currently possible to conduct inspection and sampling within the cremators, chimney and flues to assess the levels of contamination due to the operation of the crematorium. Therefore, it is recommended that samples shall be collected from the potential areas of contamination for testing of dioxin, heavy metal and PAH after decommissioning and prior to the demolition of the Existing Crematorium.

Asbestos

- 5.2.15 Asbestos wastes shall be handled in accordance with the Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste issued by the Environment and Food Bureau.
- 5.2.16 Production, collection and disposal of asbestos waste will follow the 'trip-ticket' system. The registered asbestos contractor shall appoint a licensed asbestos

waste collector to collect the packaged asbestos waste and deliver it to the designated landfill for disposal.

- 5.2.17 Since asbestos is listed in Part A of Schedule 1 to the *Waste Disposal (Chemical Waste) Regulation*, notification shall be given to EPD prior to its disposal. EPD will normally require ten working days notice of the intention to dispose of any quantity of asbestos waste. After processing the notification, EPD will issue specific instructions and directions for disposal of the waste. The waste producer or his agent must strictly follow these directions.

Dioxin Contaminated Materials (DCM) / Heavy Metal Contaminated Materials (HMCM) / Polyaromatic Hydrocarbon Contaminated Materials (PAHCM) from Demolition of the Existing Crematorium

- 5.2.18 Different contamination classifications based on the levels of DCM / HMCM / PAHCM in ash waste are proposed in Table 5-2 and the corresponding mitigation measures for their handling, transportation, treatment and disposal are described in the subsequent paragraphs.

Classification of Contamination	Dioxin Level in ash waste	Heavy Metal Level / Polyaromatic Hydrocarbon in Ash Waste
Low Contaminated DCM/HMCM/PAHCM	<1 ppb TEQ	< Dutch "B" List
Moderately/Severely Contaminated HMCM/PAHCM	<1 ppb TEQ	> Dutch "B" List
Moderately Contaminated DCM	> 1 and < 10 ppb TEQ	Any Level
Severely contaminated DCM	>10 ppbTEQ	Any Level

Table 5-2 Proposed contamination Classification for Ash Waste with DCM/HMCM

Demolition, Handling, Treatment and Disposal of Low Contaminated DCM / HMCM / PAHCM from Demolition of Existing Crematorium

- 5.2.19 Where the ash waste contains low contaminated DCM / HMCM / PAHCM, the contractor shall avoid ash waste becoming airborne during demolition. General dust suppression measures shall be followed. The ash waste can be directly disposed of at a landfill site.

Demolition, Handling, Treatment and Disposal of Moderately / Severely Contaminated DCM and Moderately / Severely Contaminated HMCM / PAHCM from Demolition of the Existing Crematorium

- 5.2.20 Site preparation procedures:
- Except for the cremators/flue/chimney, all removable contaminated items shall be removed as far as practicable to avoid obstructing the decontamination activities.

- Preliminary site decontamination of all debris shall be carried out using a High Efficiency Particulate Air (HEPA) vacuum cleaner.
- A chamber with three layers of polyethene sheets shall enclose the top portion of the chimney above the roof.
- A three-chamber decontamination unit shall be constructed at the entrance to the cremators/flues/chimney for entry and exit from the work area. It shall comprise a dirty room, a shower room and a clean room of at least 1m x 1m base with three layers of fire retardant polyethene sheet.
- Workers shall carry out decontamination procedures before leaving the work area.
- All workers should wear full protective equipment, disposable protective overalls, nitrile gloves, rubber boots, and a full-face positive pressure respirator.
- Warning signs in both Chinese and English shall be put up in conspicuous areas.

5.2.21 Site preparation procedures specific to severely contaminated DCM:

- The walls, floor and ceiling of the cremator room shall be lined with three-layers of fire retardant polyethene sheets.
- Air movers shall be installed at the cremator room, and at the bottom of the chimney to exhaust air from the work area. A stand by air mover shall also be installed with each of the air movers. Sufficient air movement shall be maintained to give a minimum of six air changes per hour to the work area.
- New pre-filters and HEPA filters shall be used on the air movers.
- Before commencement of the decommissioning work a smoke test with non-toxic smoke shall be carried out to ensure the air tightness of the containment.

5.2.22 Demolition and handling procedures:

- The cremators / flue / chimney shall be removed from top down.
- Scrubbing and HEPA vacuuming shall be used to remove any ash or residues attached to the cremators, flue, chimney and other building structures.
- Wastes generated from the contaminant or decontamination unit including the workers protection clothing shall be disposed of at landfill site.
- After completion of removal, all surfaces shall be decontaminated by HEPA vacuum cleaner.
- If any contaminated wastewater needs to be discharged from the site, it shall be properly treated to Water Pollution Control Ordinance requirements with prior agreements with EPD on discharge standards.

5.2.23 Demolition and handling procedures specific to severely contaminated DCM:

- The contaminated detached sections of the building structures shall be wrapped with two layers of fire retardant polyethene sheets. A third layer

shall be wrapped and secured with duct tape. Wet wiping shall be used to decontaminate the outer layer.

- After completion of removal and decontamination, spray the innermost layer of the fire retardant polyethene sheet with PVA. Upon drying, peel off and dispose of at landfill site. Repeat for the other two layers disposing the final layer as contaminated wastes.

5.2.24 Treatment and disposal procedures:

- Immobilise the ash waste by mixing with cement in the correct ratio as determined by pilot mixing and Toxicity Characteristic Leaching Procedure (TCLP).
- Place material in polyethene lined steel drums for disposal at landfill. The drums shall clearly be marked with "DANGEROUS CHEMICAL WASTE" in English and Chinese. Prior agreement of the disposal criteria must be obtained from EPD and the landfill operator.
- If the landfill disposal criteria cannot be met, disposal at the Chemical Waste Treatment Centre (CWTC) shall be considered.

Other Chemical Wastes

5.2.25 Should any chemical waste be generated, the contractor must register with EPD as chemical waste producer. These types of waste will be readily accepted for disposal at the CWTC.

5.2.26 All the chemical waste shall be handled according to the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*. The chemical waste shall be stored and collected by an approved contractor for disposal at a licensed facility in accordance with the *Waste Disposal (Chemical Waste) (General) Regulation*.

5.2.27 Principles of reuse and recycling chemical waste on site as far as practicable shall be adopted by the Contractor.

5.2.28 Containers used for the storage of chemical waste shall:

- Be suitable for the substance they are holding, resistant to corrosion, maintained in good condition, and securely closed;
- Have a capacity of less than 450 litres unless the specifications have been approved by EPD; and
- Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the *Waste Disposal (Chemical Waste) (General) Regulation*.

5.2.29 The storage area for chemical waste shall:

- Be clearly labelled and used solely for the storage of chemical waste;
- Be enclosed on at least three sides;
- Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest;

- Have adequate ventilation;
 - Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary); and
 - Be properly arranged so that incompatible materials are adequately separated.
- 5.2.30 Disposal of chemical waste shall be:
- Via a licensed waste collector; and
 - A facility licensed to receive chemical waste, such as the CWTC, which offers a chemical waste collection service and can supply the necessary storage containers; or
 - A waste recycling facility approved by EPD.

General Refuse

- 5.2.31 General refuse shall be stored in enclosed bins or compaction units separate from C&D and chemical wastes. A reputable waste collector shall be employed by the Contractor to remove general refuse from the site, separately from C&D and chemical wastes, on a daily or every second day basis to minimise odour, pest and litter impacts.
- 5.2.32 Individual collectors often recover aluminum cans from the waste stream if these are segregated or easily accessible. Therefore, separately labelled bins for their deposit should be provided if feasible. Similarly, plastic bottles and carton package material generated on site shall be separated for recycling as far as possible. Site office waste shall be reduced through recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme shall be considered if one is available.

Operation Phase

Ash and Non-combustible Residues

- 5.2.33 The disposal of bone ash and non-combustible residues shall be properly collected and handled to avoid dust emissions. In line with the current practices, bone ash will be stored in robust plastic bags to be collected by the deceased's relatives within the first two months free of charge (charge will be levied on subsequent months) and the non-combustible residues will be collected in polyethene bags and disposed of to landfill.

Chemical Wastes

- 5.2.34 All the chemical wastes arising from the air pollution control system, machinery maintenance and servicing shall be collected by drum type container and removed by the licensed chemical waste contractor under the provisions of the *Waste Disposal (Chemical Waste) (General) Regulations* and in accordance with the *Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes*.

General Refuse

- 5.2.35 The general refuse shall be separated from any chemical wastes and stored in covered waste skips. Food and Environmental Hygiene Department (FEHD) shall remove general refuse from the site, separately from chemical wastes, on daily basis to minimise odour, pest and litter impacts. Burning of refuse shall be strictly prohibited.
- 5.2.36 Waste generated in offices shall be reduced through segregation and collection of recyclable waste materials (such as paper and carton packages) if the volumes are large enough to warrant collection. Participation in a local collection scheme shall be considered if one is available.
- 5.2.37 To promote recycling of waste paper, aluminium cans and plastic bottles by the visitors clearly labelled recycling bins should be placed at convenient locations within the new crematorium. A reliable waste-recycling agent shall be used to collect the items on a regular basis.

6 Landscape and Visual Impact

6.1 Introduction

- 6.1.1 EM&A shall be undertaken throughout the construction phase of the Project to monitor the landscape and visual conditions. The following sections outline the requirements.

6.2 Environmental Audit

- 6.2.1 Environmental audit shall be undertaken bi-weekly for the construction phase of the Project to ensure all the implementation of landscape and visual mitigation measures are carried out. Conflicts between the proposed landscape and visual mitigation measures and other project works should be resolved at the earliest possible date without compromise to the mitigation intentions of these measures.
- 6.2.2 Baseline conditions with respect to the landscape and visual environment shall be reviewed with reference to the recorded baseline conditions of the site as described in Sections 7.5 and 7.7 of the EIA Report. The review shall in particular record existing conditions and changes of each landscape resource, landscape character area and the view conditions of each visually sensitive receiver, including glare. Parameters used to describe changes in each of the above shall be the same as in Sections 7.6 and 7.8 the EIA Report.

6.3 Mitigation Measures

Construction Phase

- 6.3.1 Table 6-1 summarises the mitigation measures recommended in the EIA Report catering for minimising any potential landscape and visual impacts arising during the construction phase.

EIA Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Stage*			Relevant Legislation & Guidelines
				D	C	O	
S.7.9.2 MC 1	Site offices and construction yards: <ul style="list-style-type: none"> ▪ Site offices shall have olive green roof and façade coating or colour matches with existing environment; and ▪ Site offices and the construction yard shall be decommissioned after construction. 	All site offices / Design and construction phases	ArchSD's Contractor	√	√		
S.7.9.2 MC 2	Height of site offices: <ul style="list-style-type: none"> ▪ The height of site offices, including the rooftop shall not exceed 10m; and ▪ Building services equipment such as antennas may exceed 10 m and shall be coated in black. 	All site offices / Design and construction phases	ArchSD's Contractor	√	√		
S.7.9.2 MC 3	Hoarding and screening: <ul style="list-style-type: none"> ▪ Where practical the site offices areas, construction yards and storage areas shall be screened using colour in harmony with the surrounding environment around the peripheries of the works area until the completion of relevant construction phases. 	All site offices and construction yard areas / Design and construction phases	ArchSD's Contractor	√	√		
S.7.9.2 MC 4	Construction plant and building material: <ul style="list-style-type: none"> ▪ Shall be orderly and carefully stored in order to appear neat and avoid visibility from outside where practical; ▪ Excess materials shall be removed from site as soon as practical; and ▪ All construction plants shall be removed from site upon completion of construction works. 	Works site / Design and construction phases	ArchSD's Contractor	√	√		

EIA Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Stage*			Relevant Legislation & Guidelines
				D	C	O	
S.7.9.2 MC 5	Construction light: <ul style="list-style-type: none"> To be oriented away from the viewing location of Visual Sensitive Receivers (VSRs); and All lighting facing sensitive receiver shall have frosted diffusers and reflective covers. 	All construction lights / Design and construction phases	ArchSD's Contractor	√	√		
S.7.9.2 MC 6	Silting trap <ul style="list-style-type: none"> Silting traps shall be installed to minimize silting to streams. 	Streams / Construction phase	ArchSD's Contractor		√		
S.7.9.3 MT 1	<ul style="list-style-type: none"> Compensation for losses: The tree compensation to tree loss ratio shall be at least 1:1 in term of quantity. About 100 trees will be planted to compensate for the loss of 54 trees. 100 trees will be planted on site and others, in locations within the vicinity approved by the Architect. 	Within the Wo Hop Shek Crematorium	ArchSD's Contractor	√	√		ETWB TCW No. 2/2004 ETWB TCW No. 3/2006
S.7.9.3 MT 2	Where practical, trees that require removal shall be transplanted on Site. If not practical, these trees will be transplanted in locations within the vicinity as approved by the Architect.	Work site / Design and construction phases	ArchSD's Contractor	√	√		ETWB TCW No. 2/2004 ETWB TCW No. 3/2006
S.7.9.3 MT 3	Amenity planting: <ul style="list-style-type: none"> Planting works shall be carried out under the supervision of a specialist landscape sub-contractor; 	As shown on mitigation measure plans /	ArchSD's & FEHD's Contractor	√	√	√	ETWB 2/2004

EIA Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Stage*			Relevant Legislation & Guidelines
				D	C	O	
	<ul style="list-style-type: none"> ▪ The rooftop of the cremation plant room shall be planted with lawn; ▪ Open spaces shall be included in the Project; ▪ Screen planting such as planting a roll of trees along the site boundary butting Kiu Tau Road shall be carried out; and ▪ New trees, shrubs and groundcover shall be carefully selected and designed to homogenize with the environment. 	All phases					
S.7.9.3 MT 4	<p>Woodland mix planting:</p> <ul style="list-style-type: none"> ▪ Woodland mix, comprising of tree seedlings and shrubs, shall be planted within the Wo Hop Shek Cemetery to enhance the ecological value and compensatory of tree loss. 	Within the Wo Hop Shek Cemetery / All phases	ArchSD's Contractor	√	√	<p>ETWB TCW No. 2/2004</p> <p>ETWB TCW No. 3/2006</p>	
S.7.9.3 MT 5	<p>Preservation:</p> <ul style="list-style-type: none"> ▪ No tree shall be transplanted or felled without prior approval by relevant Government departments; ▪ All trees that are marked for retention shall be fenced off with a 1.2m high fence around the dripline of trees or larger area as far as feasible; ▪ Transplant preparation works shall be carried as soon as possible after commencement of construction. Over-pruning such as hard pruning of tree crown, pollarding or topping shall be avoided. Rootball and crown pruning shall be carried out over at least 3 months; and ▪ Existing shrub and ground cover planting areas that will not be removed shall be maintained in good condition and enhanced where practical. 	Work site / All phases	ArchSD's Contractor	√	√	<p>ETWB TCW No. 2/2004</p> <p>ETWB TCW No. 3/2006</p>	

EIA Ref#	Environmental Protection Measures	Location / Timing	Implementation Agent	Implementation Stage*			Relevant Legislation & Guidelines
				D	C	O	
S.7.9.4 MB 1	<ul style="list-style-type: none"> The 10m height headroom cremation plant room shall be half sunken to reduce the visual impact to pedestrians. 	Cremation plant room / Design phase	ArchSD's Contractor	√	√		
S.7.9.4 MB 2	<ul style="list-style-type: none"> The chimney shall be designed to have sculptural outlook and articulated. It shall also be kept in proportion with the rest of the building. 	Chimney / Design phase	ArchSD's Contractor	√	√		
S.7.9.4 MB 3	<ul style="list-style-type: none"> The chimney stacks shall be designed to locate at the least conspicuous location of the site to VSRs. 	Chimney / Design phase	ArchSD's Contractor	√	√		

Table 6-1 Implementation Schedule for Landscape and Visual

7 Water Quality

7.1 Introduction

- 7.1.1 The water quality assessment indicated that no adverse impacts on water quality would be expected from the construction phase, with proper implementation of the environmental mitigation measures recommended in Section 8.7 of the EIA Report and Section 7.2 of this Manual. Besides, with the adoption of the 'dry' process, no effluent would be discharged from the air pollution control system and scrubbing system in the new crematorium and hence no adverse water quality impacts to the nearby receiving water body would be anticipated during the operation phase.
- 7.1.2 Water quality monitoring for construction and operation phases shall be confined to the relevant effluent discharge licensing requirements to be issued by EPD under the Water Pollution Control Ordinance (WPCO). No additional monitoring is required.
- 7.1.3 Regular site audit, outlined in Section 9 of this Manual, will serve to inspect the implementation status of the mitigation measures and ensure that any potential water quality impacts are detected and dealt with.

7.2 Mitigation Measures

Construction Phase

- 7.2.1 The Contractor shall implement the following recommended mitigation measures with reference to the Practical Note for Professional Persons, Construction Site Drainage (ProPECC PN 1/94) published by EPD to minimise any potential water quality impacts arising during the construction phase.

Construction Runoff and Drainage

- 7.2.2 Any effluent discharge from the Site is subject to the control of the WPCO discharge licence. Wastewater shall properly be treated to meet the discharge standards set out in the relevant discharge licence. No direct discharge of site runoff into the two streams shall be allowed.
- Perimeter channels shall be provided to intercept storm runoff from outside the Site. These shall be constructed in advance of site formation works and earthworks;
 - Sand/silt removal facilities such as sand traps, silt traps and sediment basins shall be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the WPCO;
 - Works shall be carefully programmed to minimise soil excavation works during rainy seasons;

- Exposed soil surface shall be protected by paving as soon as possible to reduce the potential of soil erosion;
- Temporary access roads shall be protected by crushed gravel and exposed slope surfaces shall be protected when rainstorms are likely to occur;
- Trench excavation shall be avoided in the wet season as far as practicable, and if necessary, these trenches shall be excavated and backfilled in short sections;
- Open stockpiles of construction materials on the site shall be covered with tarpaulin or similar fabric during rainstorms;
- Sand and silt in the wash water from the wheel from the wheel washing facility shall be settled out and removed before discharge into the storm drain; and
- Oil interceptors shall be included in the drainage system and regularly emptied to prevent the release of oil and grease into the storm drainage system after accidental spillage.

General Construction Activities

- 7.2.3 Debris and rubbish generated on site shall be collected, handled and disposed of properly to avoid it entering the two streams. All fuel tanks and storage areas shall be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. Open storm water drains and culverts near the works area shall be covered to block the entrance of large debris and refuse.

Sewage Generated from On-site Workforce

- 7.2.4 The sewage from construction work force shall be handled by portable chemical toilets if the existing toilets are not adequate. Appropriate and adequate portable toilets shall be provided by licensed contractors who shall be responsible for appropriate disposal and maintenance of these facilities.

Groundwater

- 7.2.5 It is possible an unknown quantity of groundwater or perched water may be encountered and this will require pumping out during construction works, particularly for basement formation during Phase I. Sheet piling shall be provided at suitable location around the basement excavation to reduce the effect of lowering the water table from any dewatering process. Any discharge of groundwater pumped out from any dewatering process of the construction works shall be treated to comply with the standards set in the relevant discharge licence prior discharge. No discharge of the groundwater shall be allowed into the two streams.

8 Ecology

8.1 Introduction

- 8.1.1 The assessment determined that the main ecological concern is vegetation clearance and disturbance within the semi-natural woodland. The works area within the semi-natural woodland would amount to approximately 0.25 ha. Within this habitat, two plant species of conservation interest, namely *Aquilaria sinensis* and *Cibotium barometz*, were identified.
- 8.1.2 Regular site audit, detailed in Section 9 of this Manual, will serve to inspect the implementation status of the mitigation measures recommended in the EIA Report.
- 8.1.3 General EM&A requirements concerning transplantation of the two species of conservation interest are recommended. Monitoring of tree transplantation should be undertaken as detailed below.
- 8.1.4 Mitigation measures including good site practice will help minimise the ecological impacts likely to be induced by the Project.

8.2 Environmental Monitoring and Audit

Environmental Audit

- 8.2.1 The implementation of mitigation measures recommended in the Section 9 of the EIA Report shall be routinely audited, once per week, during the construction phase of the Project. Detailed requirements of the environmental audit are given in Section 9 of this Manual. Implementation of the recommended ecological mitigation measures, detailed in Section 9.8 of the EIA Report and Section 8.3 of this Manual, shall be examined during the routine environmental audit.

Monitoring on Tree Transplantation

- 8.2.2 At the detailed design stage, individual trees requiring transplantation or protection, shall be reviewed based on the information illustrated in the Tree Survey Report as shown in Annex 7-b of the EIA Report. Details shall include numbers of trees to be transplanted, transplantation methodology, measures for the individuals to be protected 'in-situ' and availability of the recommended receptor sites.
- 8.2.3 The transplantation shall be carried out by a suitably qualified ecologist / horticulturist appointed by the Project Proponent. Measures to protect plants 'in-situ' shall be implemented prior to commencement of works.
- 8.2.4 For any transplantation of *Aquilaria sinensis* and *Cibotium barometz* individuals, regular monitoring shall be conducted to check on the health and conditions of the plants. It is recommended that the monitoring shall cover the

12-month period following transplantation. The monitoring shall be conducted at least twice a month for the first four months after transplantation, and once a month for the remaining eight months. The monitoring shall be conducted by a suitably qualified ecologist / horticulturist appointed by the Project Proponent. If the audit records indicate that the transplanted plants are not establishing properly, the Landscape Architect shall recommend and undertake measures to rescue the plants.

8.3 Mitigation Measures

Construction Phase

8.3.1 The following mitigation measures are recommended to minimise any potential ecological impacts arising during the construction phase.

Mitigation to Minimise Impacts on Habitat and Vegetation Loss

- Layout of the Project shall be carefully designed to avoid or minimize the area of habitat loss and the numbers of trees to be felled;
- All trees shall be preserved as far as possible, especially species of conservation concern. Recommendations provided in the Tree Survey Report to mitigate impacts on trees shall be followed;
- Disturbance to the two plant species of conservation concern, namely *Aquilaria sinensis* and *Cibotium barometz*, shall be avoided. Where removal of these species is unavoidable, it is recommended to transplant them to habitats with similar conditions. Following transplantation, regular monitoring of these plants shall be conducted by a suitable qualified botanist / horticulturist over a 12-month period;
- Transplantation of any affected trees to grassland / scrubland within the Wo Hop Shek Cemetery; and
- Compensatory planting of the felled trees shall follow the Technical Circular No. 3/2006 issued by ETWB.

Mitigation to Construction Runoff through General Good Site Practice

- Temporary access to the work sites shall be carefully planned and located to minimise disturbance caused to the streams and nearby habitats;
- Use of less or smaller construction plant may be specified to reduce disturbance to the streams and nearby habitats;
- The Site inside or in the proximity of the streams and nearby habitats shall be temporarily isolated, by placing of sandbags or silt curtains with lead edge at the bottom and properly supported props, to prevent adverse impacts on these areas;
- Natural bottom and existing flow in the streams shall be preserved as much as possible to avoid disturbance to the stream habitats;

- Appropriate storage locations situated well away from the streams and nearby habitats for the temporary storage of materials (e.g. equipment, filling materials, chemicals and fuel) and temporary stockpile of construction debris and spoil shall be identified before commencement of the works;
- Stockpiling of construction materials, if necessary, shall be properly covered and located away from the streams and nearby habitats;
- Construction debris and spoil shall be covered up and/or properly disposed of as soon as possible to avoid being washed into the streams and nearby habitats by rain;
- Construction effluent, site runoff and sewage shall be properly collected and/or treated;
- Proper locations for discharge outlets of any wastewater treatment facilities well away from the streams and nearby habitats shall be identified;
- Vehicles and other plant shall be carefully maintained and properly used to minimise the chance for accidental spillage;
- Any spillages that do occur shall be quickly identified and appropriately cleaned up before they can contaminate streams or groundwater;
- Temporary geo-textile silt fences around earth moving works shall be erected to trap any sediments being washed away and prevent them from entering surrounding areas; and
- Exposed soil or other loose materials shall be covered with tarpaulins to prevent erosion, and then seeded and covered with a biodegradable geo-textile blanket for erosion control purposes.

Mitigation for Noise and Other Disturbance on Ecological Integrity

- Use of sturdy 1.8 metres protective fencing shall be located at the edge of the tree canopy but not around the trunk, wherever feasible;
- Works beneath the tree canopy shall be avoided: If encroachment under the canopy area is unavoidable, adequate protections shall be provided to ensure no damage to any part of the tree occurs due to the encroachment;
- Any tree transplanting and planting works shall be implemented by an approved Landscape Contractor. Quality control of the work shall be undertaken by a qualified Landscape Architect through site audits and approval of works;
- Construction works shall be restricted to works area which are clearly defined;
- Woodland or other habitats that would be affected by the construction works shall be well-defined and minimised;
- Human interference to habitats beyond the site boundary and habitats proposed to be retained shall be avoided by providing temporary barricades;

- Works area shall be reinstated immediately after completion of the construction;
- Waste and other garbage generated during the construction of the proposed development shall be disposed of properly off-site; and
- Uncontrolled burning of refuse shall be strictly prohibited. Appropriate fire control measures shall be provided in order to protect nearby habitats.

9 Environmental Auditing

9.1 Site Audit

- 9.1.1 Site audit provides a direct means to initiate and enforce specified environmental protection and pollution control measures. Audits shall be undertaken routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Site audit is one of the most effective tools to enforce the environmental protection requirements within the works area.
- 9.1.2 The ET Leader shall be responsible for formulating the environmental site audit, the deficiency and action reporting system, and for carrying out the site audit works. Within 21 days of the construction contract commencement, he shall submit a proposal for site audit and deficiency and action reporting procedures to the Contractor for agreement, and to the AR for approval. The ET's proposal for rectification shall be agreed with the IEC.
- 9.1.3 Regular site audits shall be carried out at least once per week. The scope of audit shall not be limited to the environmental situation, pollution control and mitigation measures within the site; it shall also review the environmental situation outside the works area which is likely to be affected, directly or indirectly, by the site activities. The ET Leader shall make reference to the following information in conducting the audit:
- EIA recommendations on environmental protection and pollution control mitigation measures;
 - Works progress and programme;
 - Individual works methodology proposals (which shall include pollution control measures);
 - Contract specifications on environmental protection;
 - Relevant environmental protection and pollution control laws; and
 - Previous site audit results.
- 9.1.4 The Contractor shall keep the ET Leader updated with all relevant information on the construction contract necessary for him to carry out the site audits. Audit results and associated recommendations for improvements to the environmental protection and pollution control works shall be submitted to the IEC and the Contractor within 24 hours after completion of the site audit. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site audit, and the deficiency and action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site audits.
- 9.1.5 Ad hoc site audits shall also be carried out if significant environmental problems are identified. Audits may also be required subsequent to receipt of

an environmental complaint, or as part of the investigation work, as specified in the Event and Action Plan provided in Table 2-3.

9.2 Compliance with Legal and Contractual Requirements

- 9.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.
- 9.2.2 In order that the works are in compliance with the contractual requirements, all works method statements submitted by the Contractor to the AR for approval shall be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.
- 9.2.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating laws can be prevented.
- 9.2.4 The Contractor shall regularly copy relevant documents to the ET Leader so that works checking can be carried out. The document shall at least include the updated Works Progress Reports, updated Works Programme, any application letters for different licence / permits under the environmental protection laws, and copies of all valid licences / permits. The site diary shall also be available for the ET Leader's audit upon his request.
- 9.2.5 After reviewing the document, the ET Leader shall advise the IEC and the Contractor of any non-compliance with contractual and legislative requirements on environmental protection and pollution control in order for them to take follow-up action. If the ET Leader's review concludes that the current status on licence / permit application and any environmental protection and pollution control preparation works may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor and the AR accordingly.
- 9.2.6 Upon receipt of the advice, the Contractor shall undertake immediate action to correct the situation. The AR shall follow up to ensure that appropriate action has been taken by the Contractor in order to satisfy contractual and legal requirements.

9.3 Environmental Complaints

- 9.3.1 Complaints shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any complaint:
- Log complaint and date of receipt onto the complaint database and inform the IEC immediately;
 - Investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;
 - Identify mitigation measures if a complaint is valid and due to works;
 - Advise the Contractor if mitigation measures are required;

- Review the Contractor's response to the identified mitigation measures, and the updated situation;
- If the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;
- Undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
- Report investigation results and subsequent actions to complainant (if the source of complaint is transferred from EPD, the results shall be reported within the timeframe assigned by EPD); and
- Record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

10 Reporting

10.1 General

- 10.1.1 The ET Leader shall prepare and certify the EM&A Reports in accordance with the following reporting requirements. The following report requirements are based upon a paper documented approach, however, the same information can be provided in an electronic form upon agreeing the format with the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time and proactive approach.
- 10.1.2 The types of reports that the ET Leader shall prepare and submit include baseline monitoring report, monthly EM&A report, quarterly EM&A summary report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports shall be made available to the Director of Environmental Protection.

10.2 Baseline Monitoring Report

- 10.2.1 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IEC, the AR and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies they require. The report format and baseline monitoring data format shall be agreed with EPD prior to submission.
- 10.2.2 The baseline monitoring report shall include at least the following:
- (i) Up to half a page executive summary;
 - (ii) Brief Project background information;
 - (iii) An updated construction programme with milestones of environmental protection / mitigation activities annotated;
 - (iv) Drawings showing locations of the baseline monitoring stations;
 - (v) Monitoring results (in both hard and diskette copies) together with the following information:
 - Monitoring methodology;
 - Name of laboratory and types of equipment used and calibration details;
 - Parameters monitored;
 - Monitoring locations;
 - Monitoring date, time, frequency and duration; and

- Quality assurance (QA) / quality control (QC) results and detection limits;
- (vi) Details of influencing factors, including:
- Major activities, if any, being carried out on the site during the period;
 - Weather conditions during the period; and
 - Other factors which might affect the monitoring results;
- (vii) Determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- (viii) Revisions for inclusion in the EM&A Manual; and
- (ix) Comments, recommendations and conclusions.

10.3 Monthly EM&A Reports

- 10.3.1 The results and findings of all EM&A work required by the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due no later than two months after construction commences. Each monthly EM&A report shall be submitted to the following parties: the Contractor, the IEC, the AR and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the required number of copies and format of the monthly reports in terms of hard copy and / or electronic format.
- 10.3.2 The ET leader shall review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

First Monthly EM&A Report

- 10.3.3 The first monthly EM&A report shall include at least the following:
- (i) Executive summary (1-2 pages):
- Breaches of Action and Limit levels;
 - Complaint log;
 - Notifications of any summons and successful prosecutions;
 - Reporting changes; and
 - Future key issues.
- (ii) Basic Project information:
- Project organisation including key personnel contact names and telephone numbers;

- Construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection / mitigation measures for the month;
 - Management structure; and
 - Work undertaken during the month.
- (iii) Environmental status:
- Work undertaken during the month with illustrations (such as location of works, percentage of fines in the fill material used, etc); and
 - Drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).
- (iv) Summary of EM&A requirements including:
- All monitoring parameters;
 - Environmental quality performance limits (Action and Limit levels);
 - Event-Action Plans;
 - Environmental mitigation measures, as recommended in the EIA Report for the Project; and
 - Environmental requirements in Contract documents.
- (v) Implementation status:
- Advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report for the Project, summarized in the updated implementation schedule.
- (vi) Monitoring results (in both hard and diskette copies) together with the following information:
- Monitoring methodology;
 - Name of laboratory and types of equipment used and calibration details;
 - Parameters monitored;
 - Monitoring locations;
 - Monitoring date, time, frequency, and duration;
 - Weather conditions during the period;
 - Graphical plots of the monitored parameters in the month annotated against;
 - The major activities being carried out on site during the period;
 - Weather conditions that may affect the results;
 - Any other factors which might affect the monitoring results; and

- QA/QC results and detection limits.
- (vii) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- Record of all non-compliance (exceedances) with the Action and Limit levels);
 - Record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - Record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (viii) Others
- An account of the future key issues as reviewed for the works programme and work method statements;
 - Advice on the solid and liquid waste management status; and
 - Summary on the implementation status of environmental mitigation measures, proactive environmental mitigation measures, environmental licensing and permits status, environmental monitoring schedule and complaint log summarising the EM&A of the period.

Subsequent EM&A Reports

10.3.4 Subsequent monthly EM&A reports shall include the following:

- (i) Executive summary (1 - 2 pages):
 - Breaches of Action and Limit levels;
 - Complaints log;
 - Notifications of any summons and successful prosecutions;
 - Reporting changes; and
 - Future key issues.
- (ii) Basic Project information:
 - Project organisation including key personnel contact names and telephone numbers;

- Programme;
 - Management structure; and
 - Work undertaken during the month.
- (iii) Environmental status:
- Work undertaken during the month with illustrations (such as location of works, daily excavation rate, etc.); and
 - Drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- (iv) Implementation status:
- Advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report for the Project, summarised in the updated implementation schedule.
- (v) Monitoring results together with the following information:
- Monitoring methodology;
 - Name of laboratory and types of equipment used and calibration details;
 - Parameters monitored;
 - Monitoring locations;
 - Monitoring date, time, frequency, and duration;
 - Weather conditions during the period;
 - Graphical plots of the monitored parameters in the month annotated against;
 - The major activities being carried out on site during the period;
 - Weather conditions that may affect the results;
 - Any other factors which might affect the monitoring results; and
 - QA / QC results and detection limits.
- (vi) Report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- Record of all non-compliance (exceedances) with the Action and Limit levels;
 - Record of all complaints received (written or verbal), including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - Record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control

legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;

- Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(vii) Others

- An account of the future key issues as reviewed from the works programme and works method statements;
- Advice on the solid and liquid waste management status; and

(viii) Appendix

- Action and Limit levels;
- Graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - Major activities being carried out on site during the period;
 - Weather conditions during the period; and
 - Any other factors that might affect the monitoring results.
- Monitoring schedule for the present and next reporting period;
- Cumulative statistics on complaints, notifications of summons and successful prosecutions;
- Outstanding issues and deficiencies; and
- Details of complaints, outstanding issues and deficiencies.

10.4 Quarterly EM&A Summary Reports

10.4.1 A quarterly EM&A summary report of around five pages (consisting of about three of text and tables and two of figures) shall be produced and shall contain at least the following information. The quarterly EM&A report shall be prepared and submitted within 10 working days of the end of each reporting quarter.

- (i) Executive summary (half page);
- (ii) Basic Project information including a synopsis of the Project organisation, programme, contacts of key management, and the work undertaken during the quarter;
- (iii) A brief summary of EM&A requirements including:

- Monitoring parameters;
 - Environmental quality performance limits (Action and Limit levels); and
 - Environmental mitigation measures, as recommended in the EIA Report for the Project;
- (iv) Advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report for the Project, summarised in the updated implementation schedule;
- (v) Drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- (vi) Graphical plots of any trends of monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against the following:
- The major activities being carried out on site during the period;
 - Weather conditions during the period; and
 - Any other factors which might affect the monitoring results;
- (vii) Advice on the solid and liquid waste management status;
- (viii) A summary of non-compliance (exceedances) with the Action and Limit levels;
- (ix) A brief review of the reasons for and the implications of any non-compliance, including a review of pollution sources and working procedures;
- (x) A summary description of actions taken in the event of non-compliance and any follow-up procedures related to any earlier non-compliance;
- (xi) A summarised record of all complaints received (written or verbal), liaison and consultation undertaken, actions and follow-up procedures taken;
- (xii) A summary record of notification of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;
- (xiii) Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and
- (xiv) Proponents' contacts and any hotline telephone number for the public to make enquiries.

10.5 Final EM&A Review Reports

10.5.1 The termination of EM&A programme shall be determined on the following basis:

- Completion of construction activities and insignificant environmental impacts of the remaining outstanding construction works;
- Trends analysis to demonstrate the reduction of monitoring exceedances due to construction activities and the return to ambient environmental conditions comparable with baseline data; and
- No unsolved environmental complaint and prosecution.

10.5.2 The proposed termination may be subject to consultation with related local community such as village representative / committee and / or District Board and the proposal shall be endorsed by the IEC, AR and the Project Proponent prior to final approval from EPD.

10.5.3 The final EM&A report shall include, inter alia, the following information:

- (i) Executive summary (1 - 2 pages);
- (ii) Drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring stations;
- (iii) Basic Project information including a synopsis of the Project organisation, contacts of key management, and the work undertaken during the entire construction period;
- (iv) A brief summary of EM&A requirements including:
 - Monitoring parameters;
 - Environmental quality performance limits (Action and Limit levels); and
 - Environmental mitigation measures, as recommended in the EIA Report for the Project;
- (v) Advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report for the Project, summarised in the updated implementation schedule;
- (vi) Graphical plots of the trends of monitored parameters over the construction period for representative monitoring stations annotated against the following:
 - The major activities being carried out on site during the period;
 - Weather conditions during the period;
 - Any other factors which might affect the monitoring results; and

- The return of ambient environmental conditions in comparison with baseline data;
- (vii) Compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies;
- (viii) Provide clear-cut decisions on the environmental acceptability of the Project with reference to the specific impact hypothesis;
- (ix) Advice on the solid and liquid waste management status;
- (x) A summary of non-compliance (exceedances) with the Action and Limit levels;
- (xi) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- (xii) A description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- (xiii) A summary record of all complaints received (written or verbal), liaison and consultation undertaken, actions and follow-up procedures taken;
- (xiv) Review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);
- (xv) A summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislation, locations and nature of the breaches, investigation, follow-up actions taken and results;
- (xvi) A review of the practicality and effectiveness of the EIA process and EM&A programme (e.g. effectiveness and efficiency of the mitigation measures). Recommendation of any improvement in the EM&A programme; and
- (xvii) A conclusion to state the return of ambient and / or the predicted scenario as per EIA findings.

10.6 Data Keeping

- 10.6.1 No site-based documents (such as monitoring field records, laboratory analysis records, site audit forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be kept by the ET Leader and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in electronic form, and the software copy must be available upon request. Data format shall be agreed with EPD. All documents and data shall be kept by the ET Leader for at least one year following completion of the construction Contract.

10.7 Interim Notifications of Environmental Quality Limit Exceedances

- 10.7.1 With reference to the Event and Action Plan in Table 2-3, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the AR, the IEC and EPD, as appropriate. The notification shall be followed up with advice to EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notifications is presented in Appendix D.

10.8 Electronic Reporting of EM&A Information

- 10.8.1 Electronic copies of all reports shall be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 4.0 or later), unless otherwise agreed by EPD and shall be submitted to the AR and to EPD with the hard copies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of these reports shall be included in the beginning of the document. Hyperlinks to all figures, drawings and tables in these reports shall be provided in the main text from where the respective references are made.

Appendix A Environmental Mitigation Implementation Schedule

Appendix A Environmental Mitigation Implementation Schedule

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
Air (Construction Phase)								
S.3.3.5		Under the Air Pollution Control (Specified Process) Regulation, an incinerator (including cremator) with an installed capacity exceeding 0.5 tonnes per hour, is classified as a specified process, and requires a Specified Process licence to operate. FEHD shall apply for a specified licence under the APCO.	New Cremators in the New Crematorium / prior to operation	FEHD		✓	✓	APCO
S.3.9		Asbestos Investigation:	Incense burner, coffin and skeletal crematorium / Prior to any demolition work commencing	Arch SD, Registered Asbestos Consultant, Registered Asbestos Contractor		✓		APCO AIR and AAP
S.3.9.2	<ul style="list-style-type: none"> The incense burner, coffin and skeletal crematorium shall be thoroughly investigated prior to any demolition work commencing to ascertain the presence of any ACM. A registered asbestos consultant shall carry out an asbestos investigation report (AIR). 							
S.3.9.3	<ul style="list-style-type: none"> If any ACM are identified in the existing crematorium, an asbestos abatement plan shall be submitted to EPD prior to any asbestos abatement works. 							
S.3.9.4	<p>The following precautionary and mitigation measures shall be implemented during the removal of ACM:</p> <ul style="list-style-type: none"> Enclosure of the work area. Containment and sealing for the asbestos containing waste. Provision of personal decontamination facility. Use of personal respiratory/protection equipment. Use of vacuum cleaner equipped with high-efficiency air particulate (HEPA) filter for cleaning up the work area. Carrying out air quality monitoring during the asbestos abatement works. 							
S.3.9.5	<p>The following qualified personnel shall be appointed to carry out the asbestos abatement works:</p> <ul style="list-style-type: none"> Registered asbestos contractor for carrying out the asbestos removal works. Registered asbestos supervisor for supervising the asbestos abatement works. Registered asbestos laboratory for monitoring the air quality during the asbestos abatement works. Registered asbestos consultant for supervising and certifying the asbestos abatement works. 							

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
S.3.9.7 – S.3.9.9		Other Site Management:						
S.3.9.7		The asbestos materials in each building/premises must be abated before other contractors/trades are allowed to work in the building/premises.						
S.3.9.8		Tight security measures shall be taken at the asbestos abatement works site to prevent any disturbance to ACM that may result from the stealing of valuable items on site such as electrical cable and copper pipes. It is recommended that priority shall be given for the abatement of all friable ACM.						
S.3.9.9		As different contractors may be working on-site at the same time, the following measures should be considered: <ul style="list-style-type: none"> ▪ If there is a sensitive receptor around the area, conduct environmental air monitoring at this off-site receptor. ▪ Submit to EPD a completion report, including photos and air monitoring results, immediately after completion of asbestos abatement work for every work zone. 						
S.3.10.1- S.3.10.2		The contractor has a responsibility to notify EPD for undertaking any 'notifiable' works prior to the commencement of such works. In addition, the contractor is also required to fulfil specific dust control requirements given in the APCO Regulation's Schedule for specific jobs.	Prior to 'notifiable' works including Construction of the foundation of a building and construction of the superstructure of a building	Contractor		✓		Air Pollution Control (Construction Dust) Regulation APCO
S.3.10.3 - S.3.10.4	S.2.9.1 - S.2.9.3	Good site management / practices to avoid / minimise incidences of dust emissions: <i>Site Boundary and Entrance</i> <ul style="list-style-type: none"> ▪ Vehicle washing facilities including a high pressure water jet shall be provided at every discernible or designated vehicle exit point. ▪ The area at which vehicle washing takes place and the section of the road between the washing facilities and the exit point shall be paved with concrete, bituminous or hardcore material. <i>Access Haul Roads and Unpaved Areas</i> <ul style="list-style-type: none"> ▪ Each and every main haul road shall be paved with concrete, bituminous hardcore materials or metal plates, and kept clear of dusty materials. or 	Project Site / Construction and Demolition	Contractor		✓		Air Pollution Control (Construction Dust) Regulation APCO

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
		<ul style="list-style-type: none"> ▪ Unpaved haul roads and areas shall be sprayed with water so as to keep the entire road surface wet. 						
		<p><i>Excavated Materials</i></p> <ul style="list-style-type: none"> ▪ Any stockpile of dusty material shall be either: (a) covered entirely by impervious sheeting. (b) placed in an area sheltered on the top and the three sides. or (c) sprayed with water or a dust suppression chemical so as to maintain the entire surface wet. <p><i>Exposed Earth</i></p> <ul style="list-style-type: none"> ▪ Exposed earth shall be properly treated by compaction, hydroseeding, vegetation planting or seeding with latex, vinyl, bitumen within six months after the last construction activity on the site or part of the site where the exposed earth lies. <p><i>Loading, Unloading or Transfer of Dusty Materials</i></p> <ul style="list-style-type: none"> ▪ All dusty materials shall be sprayed with water immediately prior to any loading or transfer operation so as to keep the dusty material wet. <p><i>Debris Handling</i></p> <ul style="list-style-type: none"> ▪ Any debris shall be covered entirely by impervious sheeting or stored in a debris collection area sheltered on the top and the three sides. ▪ Before debris is dumped into a chute, water shall be sprayed so that it remains wet when it is dumped. <p><i>Transport of Dusty Materials</i></p> <ul style="list-style-type: none"> ▪ Vehicles used for transporting dusty materials/spoils shall be covered with tarpaulin or similar material. The cover shall extend over the edges of the sides and tailboards. <p><i>Site Clearance</i></p> <ul style="list-style-type: none"> ▪ The working area for the uprooting of trees, shrubs, or vegetation or the removal of boulders, pole, pillars shall be sprayed with water immediately before, during and immediately after the operation so as to maintain the entire surface wet. ▪ All demolished items shall be covered by impervious sheeting or placed in a spot with shelters on top and three sides within a day of the demolition. 						
		<ul style="list-style-type: none"> ▪ Workers at all levels should be co-operative to avoid dust generation and dispersion to the surrounding environment. 						

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
Air (Operation Phase)								
S.3.10.7	S.2.9.4	<ul style="list-style-type: none"> ▪ The cremators of equivalent specifications equipped with the latest technological flue gas filtering and emission monitoring system that would meet the BPM12/2 (06) emission requirements shall be adopted. ▪ Proper operation and maintenance of the new crematorium and air pollution control unit of the cremators shall be ensured in order to avoid any uncontrolled emissions due to malfunctioning of the cremator or air pollution control unit. 	New Cremators in New Crematorium/ Design and Operation stage	ArchSD, FEHD	✓		✓	BPM 12/2 APCO
S.3.6.35		Dead bodies shall be delivered to the crematorium and immediately stored in the mortuary with refrigeration in order to control the odour from the dead body.						
S.3.7.29		<p>To minimise the possible nuisance due to joss paper burning, FEHD will limit joss paper burning activities through administration procedures as follows:</p> <ul style="list-style-type: none"> ▪ Joss paper burners shall be allowed for use in memorial ceremonies upon request only. ▪ Other usage of joss paper burners shall not be allowed ▪ Guidance shall be provided to the users to advise them to minimise the quantity of burning materials. ▪ FEHD staff shall advise users to ensure better combustion of the joss papers in order to reduce smoke emission. 	Joss paper burners / Operation	FEHD			✓	APCO
Air (EM&A for Construction Phase)								
S.11.2.4 - S.11.2.5	S.2.5 - S.2.6	Conduct baseline and regular 1-hr and 24-hr TSP monitoring at 2 measurement locations at a 6-day frequency	A22a and A22b / Baseline monitoring prior to construction works / Regular monitoring throughout construction period	Contractor		✓		EIAO
Air (EM&A for Operation Phase)								
S.11.3.2- S.11.3.6	S.2.8.1 - S.2.8.4	<p>Conduct continuous monitoring for the following pollutants and processes:</p> <ul style="list-style-type: none"> ▪ Temperature inside primary combustion zone. ▪ Temperature and oxygen content of the gas at appropriate location(s) to demonstrate requirements can be complied with. ▪ Carbon monoxide concentration at the outlet from the secondary combustion zone. 	Cremators and chimney of the New Crematorium/ Operation	FEHD			✓	APCO BPM12/2

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
		<ul style="list-style-type: none"> ▪ Gas opacity at the chimney of the cremator. ▪ Other essential operating parameter(s) that may affect the performance of air pollution control measures. 						
S.11.3.6- S.11.3.10	S.2.8.4 - S.2.8.7	Conduct periodic measurement for the following pollutants: <ul style="list-style-type: none"> ▪ Particulate Matters ▪ Hydrogen Chloride ▪ Carbon Monoxide ▪ Organic Compounds ▪ Mercury ▪ Dioxins ▪ Smoke Density 						
Noise (Construction Phase)								
S.4.4.9 - S.4.4.10	S.3.2.1 - S.3.2.2	Good Site Practice and Noise Management: <ul style="list-style-type: none"> ▪ Only well-maintained plant shall be operated on site and the plant shall be regularly serviced during the construction works. ▪ Plant used intermittently shall be turned off or throttled down when not in active use. ▪ Plant that is known to emit noise strongly in one direction shall be oriented to face away from NSRs. ▪ Silencers, mufflers and enclosures for plant shall be used where possible and maintained adequately throughout the works. ▪ Mobile plant shall be sited away from NSRs. ▪ Stockpiles of excavated materials and other structures such as site buildings shall be used effectively to screen noise from the works. ▪ PME shall be well maintained and use properly on site to minimise the any excessive noise generated. 	Work site / Construction phase	Contractor	✓	✓		GW-TM & NCO
Noise (Operation Phase)								

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
	S.3.2.4	<ul style="list-style-type: none"> ▪ Quantities and maximum sound power level of the fixed plants shall not exceed the plant inventory as assessed in the EIA report. ▪ Noise from the operation of the concerned fixed-noise sources can be further reduced by locating it as far as practical from the NSRs, and / or by orientating the noise emission points away from the NSRs, and / or by implementation of silencers and acoustic barriers to the concerned equipment. 	All fixed-noise sources of the new crematorium / Design and operation phases	Arch SD, FEHD	✓		✓	NCO
Land Contamination (Construction Phase)								
S.5.7.2		<p>Remedial Action Plan:</p> <p>If large amounts of contaminated soil (say 500m³) are found following further site investigation after the decommissioning of the crematorium, remediation options such as bioremediation for organics should be considered. Although disposal of small amount of contaminated soil to landfills might be considered as an economic and acceptable option for remediation, it should be considered as the last resort if all remediation options including reuse are considered to be inappropriate or infeasible.</p>	All areas requiring remedial works in Project site	Contractor		✓		<p>Waste Disposal Ordinance (Cap.354)</p> <p>Waste Disposal (Chemical Waste) Regulations</p> <p>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</p> <p>CAP</p> <p>ProPECC Note PN3/94</p>
S.5.7.3		<ul style="list-style-type: none"> ▪ If disposal to landfills is chosen as the remediation measure, the criteria set primarily of Toxicity Characteristic Leaching Procedure (TCLP) limits, as stated in Annex E in the GN) should be met. ▪ At least three soil samples should be taken from the most contaminated area(s) and tested for TCLP for a full suite of parameters (16 metals) as stated in Table E1 in Annex E in the GN. ▪ If the testing result shows that any of the TCLP limits cannot be met, the soil shall be treated by cement stabilization and further tested for TCLP prior to landfill disposal or treated as chemical waste and disposed of at the Chemical Waste Treatment Centre (CWTC). 						<p>Dutch A, B, C Classification system</p> <p>WPCO</p>
S.5.7.4		All soil treated as a chemical waste, shall be collected by a registered chemical waste contractor and the Waste Disposal (Chemical Waste) Regulations under the Waste Disposal Ordinance (Cap.354) shall be observed. Reference shall be made to the Registration of Chemical Waste Producers and Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes, issued by EPD.						<p>Technical Memorandum on</p>
S.5.7.6		<p>Confirmatory Soil Sampling</p> <ul style="list-style-type: none"> ▪ In order to confirm the extent of the soil contamination and if the contaminated soil should be removed or treated, confirmatory soil sampling shall be carried out during the remediation works. 						

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
		<ul style="list-style-type: none"> This shall consist of five to six samples in each location where soil contamination is identified from SI works. The locations will be to the north, south, east and west of the location where contaminated soil is found. Two locations should also be above and below the location (in terms of elevation) where contaminated soil is found. If analytical results exceed the Dutch B Levels or other agreed remedial target suggested in a supplementary CAR, the contaminated area shall be extended and further confirmatory sampling shall be carried out until no further contamination is encountered. 						Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters (TM)
S.5.8	S.4	Further Site Investigation	<p>Areas that are currently in use and cannot be accessed, including the transformer room, dangerous goods stores, day tank room, fuel pump room, sunken fuel pipe and cremator.</p> <p>The demolition contractor shall carry out further site investigations, after the decommissioning of the existing crematorium and skeletal cremator building.</p> <p>Potential contaminants in the soils have been identified in CAP and the parameters to be analysed for soils at different locations are summarised in Table 5-3 in S.5.8.3.</p> <p>Sampling and analysis plans for these investigations shall be prepared and submitted to EPD for approval prior to any of these investigation works. Supplementary CAR and RAP shall be prepared to describe the results and findings of these site investigations and, if necessary, any remedial works.</p> <p>After removal of the underground fuel tanks, confirmatory soil samples should be collected and tested in accordance with S.5.7.6 to ensure that no contamination due to fuel leakage.</p> <p>After the decommissioning of the existing crematorium and skeletal cremator building.</p>	Contractor		✓		Interim CAR and RAP
S.5.8.1	S.4.1 - S.4.7	Further site investigations in areas that are currently in use and cannot be accessed are required. These areas include the transformer room, dangerous goods stores, day tank room, fuel pump room, sunken fuel pipe and cremator.			ProPECC Note PN3/94			
S.5.8.2					Guidance Notes for Investigation and Remediation of Contaminated Sites of Petrol Filling Stations, Boatyards and Car Repair / Dismantling Workshops			
S.5.8.3								
S.5.8.4								
S.5.8.5								
Land Contamination (EM&A)								
S.11.2.9 - S.11.2.15	S.4.1 - S.4.7	<p>Further Site Investigation:</p> <ul style="list-style-type: none"> Conduct further site investigation for Petroleum hydrocarbons and PAH in soil samples. 	After decommissioning, prior to construction:	Contractor		✓		Interim CAR & RAP

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
		<ul style="list-style-type: none"> ▪ Conduct further site investigation for PCBs in soil samples. ▪ Conduct further site investigation for PAH, Dioxins and Metals (Cr, Co, Ni, Cu, Zn, As, Mo, Cd, Sn, Ba, Hg, Pb) in soil samples. 	<p>Existing crematorium: Dangerous goods store, Daily tank room, fuel pump room and sunken fuel pipe Skeletal Cremator Building: Dangerous goods store</p> <p>Existing crematorium: Transformer room Cremators (residual inside the cremator, flue and chimneys)</p>					
Waste Management (Construction Phase)								
S.6.7.24		<p>Good Site Practice:</p> <ul style="list-style-type: none"> ▪ Obtain the necessary waste disposal permits from the appropriate authorities, if they are required, in accordance with the Waste Disposal Ordinance (Cap. 354), Waste Disposal (Chemical Waste) (General) Regulation and the Land (Miscellaneous Provision) Ordinance (Cap. 28). ▪ Obtain a billing account with EPD for disposal of construction waste. <p>▪ A Waste Management Plan (WMP), incorporated in an Environmental Management Plan (EMP) shall be prepared and submitted to the Engineer/Supervising Officer for approval. Reference shall be made to Environment, Transport and Works Bureau Technical Circular (Works) (ETWB TCW) 19/2005.</p> <ul style="list-style-type: none"> ▪ Nomination of an approved person to be responsible for good site practice, arrangements for collection and effective disposal to an appropriate facility of all wastes generated at the site. ▪ Use of a waste haulier, authorised or licensed to collect specific category of waste. 	Project site/ design, construction and demolition stages	Contractor		✓		<p>Waste Disposal Ordinance (Cap. 354)</p> <p>Waste Disposal (Chemical Waste) (General) Regulation</p> <p>Waste Disposal (Charges for Disposal of Construction Waste) Regulation</p>

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
		<ul style="list-style-type: none"> ▪ A trip-ticket system shall be included as one of the contractual requirements and implemented by the Environmental Team to monitor the disposal of C&D and solid wastes at public filling facilities and landfills, and to control fly tipping. Reference shall be made to ETWB TCW No. 31/2004. ▪ Training of site personnel in proper waste management and chemical waste handling procedures. ▪ Separation of chemical wastes for special handling and appropriate treatment at a licensed facility. ▪ Routine cleaning and maintenance programme for drainage systems, sumps and oil interceptors. ▪ Provision of sufficient waste disposal points and regular collection for disposal. ▪ Adoption of appropriate measures to minimise windblown litter and dust during transportation of waste, such as covering trucks or transporting wastes in enclosed containers. ▪ Implementation of a recording system for the amount of wastes generated, recycled and disposed of (including the disposal sites). 						<p>ETWB TCW No. 19/2005</p> <p>ETWB TCW No. 31/2004</p>
S.6.7.25		<p>Waste Reduction Measures:</p> <ul style="list-style-type: none"> ▪ Segregation and storage of different types of waste in different containers, skips or stockpiles to enhance reuse or recycling of materials and their proper disposal. ▪ Encourage collection of aluminium cans, plastic bottles and packaging material (e.g. carton boxes) and office paper by individual collectors. Separate labelled bins shall be provided to help segregate this waste from other general refuse generated by the work force. 	Project site / construction and demolition stages	Contractor		✓		<p>WBTC No. 32/1992</p> <p>WBTC No. 19/2005</p>
		<ul style="list-style-type: none"> ▪ Any unused chemicals or those with remaining functional capacity shall be recycled as far as practicable. ▪ Reuse C&D materials when possible to reduce the amount of C&D material/waste. ▪ Wood, steel and other metals shall be separated for reuse and / or recycling Prior to disposal of C&D waste to minimise the quantity of waste to be disposed of to landfill. ▪ Minimise the potential for damage or contamination of construction material by having proper storage and site practices. 						

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
		<ul style="list-style-type: none"> Plan and stock construction materials carefully to minimise the amount of waste generated. 						
S.6.7.4		<p><i>Excavated Material</i></p> <p>Rock and soil generated from excavation shall be reused for site formation and excavated material from foundation work reused for landscaping as far as practicable to avoid disposal off-site.</p>	Project site / construction and demolition stages	Contractor		✓		WBTC No. 12/2000
S.6.7.5 - S.6.7.7	S.5.3.5 - S.5.3.9	<p><i>Construction and Demolition Material</i></p> <ul style="list-style-type: none"> Reuse of the public fill and C&D waste shall be practiced on site as far as practicable. The handling of C&D materials is governed by WBTC No. 2/93. Inert C&D material (public fill) shall be directed to an approved public filling area or reclamation site, where it has the benefit of offsetting the need for removal of materials from borrow areas for reclamation purposes and helps to reduce the pressure on landfill sites. Individuals or companies who deliver public fill to public filling areas require dumping licences. 	Project site / construction and demolition stages	ArchSD / Contractor	✓	✓		<p>WBTC No. 2/93</p> <p>The Land (Miscellaneous Provision) Ordinance</p> <p>WBTC No. 19/2005</p>
		<ul style="list-style-type: none"> Careful design, planning and good site management can minimise over-ordering and generation of waste materials such as concrete, mortar and cement grouts. The design of formwork shall maximise the use of standard wooden or metal panels so that high reuse levels can be achieved. Alternatives such as steel formwork, plastic fencing and reusable site office structures shall be considered to increase the potential for reuse and minimise C&D waste generation. The contractor shall use as much as possible of the C&D material on-site. Proper segregation of waste types on site will increase the feasibility of certain components of the waste stream by recycling contractors. 						

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines												
					D	C	O													
S.6.11.1 - S.6.11.5	S.5.3.10 - S.5.3.14	<p>Contaminated Material – Further Contamination Investigation</p> <ul style="list-style-type: none"> After decommissioning but prior to demolition of the Existing Crematorium, the following further contamination investigations shall be carried out to confirm the quality and quantity of ash waste and building structures requiring treatment and disposal. <table border="1"> <thead> <tr> <th>Location</th> <th>Investigation Parameter</th> <th>Investigation Period</th> <th>Responsible Party</th> </tr> </thead> <tbody> <tr> <td>Cremators / flue / chimney and surrounding areas</td> <td>Asbestos (building structures)</td> <td>After decommissioning but prior to demolition of the Existing Crematorium</td> <td>The Contractor</td> </tr> <tr> <td>Cremators / flue / chimney and surrounding areas</td> <td>Dioxins, heavy metals, PAH (ash waste)</td> <td></td> <td></td> </tr> </tbody> </table> <ul style="list-style-type: none"> Prior to any demolition work commencing, these areas suspected to contain asbestos containing material (ACM) shall be further inspected by a registered asbestos consultant to determine the presence of any ACM. These areas shall be thoroughly investigated and the additional findings submitted as supplementary information to the Asbestos Investigation Report. Samples shall be analysed for the presence and type of asbestos according to the Laboratory's HOKLAS accredited testing procedures. If the findings of the investigation indicate ACM materials present on the premises an Asbestos Abatement Plan must be prepared prior to commencement of demolition works. It is not currently possible to conduct inspection and sampling within the cremators, chimney and flues to assess the levels of contamination due to the operation of the crematorium. It is recommended that samples shall be collected from the potential areas of contamination for testing of dioxin, heavy metal and PAH after decommissioning and prior to the demolition of the Existing Crematorium. 	Location	Investigation Parameter	Investigation Period	Responsible Party	Cremators / flue / chimney and surrounding areas	Asbestos (building structures)	After decommissioning but prior to demolition of the Existing Crematorium	The Contractor	Cremators / flue / chimney and surrounding areas	Dioxins, heavy metals, PAH (ash waste)			Cremators, Flues Chimneys and surrounding areas / After decommissioning but prior to demolition of the existing crematorium.	FEHD, ArchSD, Contractor		✓		ProPECC PN 2/97 ProPECC PN 3/94 APCO
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Cremators / flue / chimney and surrounding areas	Dioxins, heavy metals, PAH (ash waste)																			
S.6.9.6 - S.6.9.7	S.5.3.15 - S.5.3.17	<p>Asbestos Containing Material</p> <ul style="list-style-type: none"> Asbestos wastes shall be handled in accordance with the Code of Practice on the Handling, Transportation and Disposal of Asbestos Waste issued by the Environment and Food Bureau. 	Cremator room in Existing Crematorium / before demolition	Contractor		✓		COP on Handling, Transportation and Disposal of Asbestos Waste												

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		<ul style="list-style-type: none"> Production, collection and disposal of Asbestos waste will follow the 'trip-ticket' system. The registered asbestos contractor shall appoint a licensed asbestos waste collector to collect the packaged asbestos waste and deliver it to the designated landfill for disposal. Notification has to be given to EPD for its disposal. EPD will normally require ten working days notice of the intention to dispose of any quantity of asbestos waste. After processing the notification, EPD will issue specific instructions and directions for disposal of the waste. The waste producer or agent must strictly follow these directions. 	and after decommission				under the Waste Disposal (Chemical Waste) (General) Regulation.															
S.6.9.8	S.5.3.18	<ul style="list-style-type: none"> Dioxin Contaminated Materials (DCM) / Heavy Metal Contaminated Materials (HMCM) / Polyaromatic Hydrocarbon Contaminated Materials (PAHCM) from Demolition of the Existing Crematorium Proposed Contamination Classifications for Ash Waste with DCM / HMCM / PAHCM. <table border="1" data-bbox="430 678 1198 1077"> <thead> <tr> <th>Classification of Contamination</th> <th>Dioxin Level in ash waste</th> <th>Heavy Metal Level / Polyaromatic Hydrocarbon in Ash Waste</th> </tr> </thead> <tbody> <tr> <td>Low Contaminated DCM/HMCM/PAHCM</td> <td><1 ppb TEQ</td> <td>< Dutch "B" List</td> </tr> <tr> <td>Moderately/Severely Contaminated HMCM/PAHCM</td> <td><1 ppb TEQ</td> <td>> Dutch "B" List</td> </tr> <tr> <td>Moderately Contaminated DCM</td> <td>> 1 and < 10 ppb TEQ</td> <td>Any Level</td> </tr> <tr> <td>Severely contaminated DCM</td> <td>>10 ppbTEQ</td> <td>Any Level</td> </tr> </tbody> </table> 	Classification of Contamination	Dioxin Level in ash waste	Heavy Metal Level / Polyaromatic Hydrocarbon in Ash Waste	Low Contaminated DCM/HMCM/PAHCM	<1 ppb TEQ	< Dutch "B" List	Moderately/Severely Contaminated HMCM/PAHCM	<1 ppb TEQ	> Dutch "B" List	Moderately Contaminated DCM	> 1 and < 10 ppb TEQ	Any Level	Severely contaminated DCM	>10 ppbTEQ	Any Level	Cremator room in Existing Crematorium / before demolition and after decommission	Contractor		✓	ProPECC PN 3/94 APCO
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S.6.9.9	S.5.3.19	Demolition, Handling, Treatment and Disposal of Low Contaminated DCM / HMCM / PAHCM from Demolition of Existing Crematorium <ul style="list-style-type: none"> Where the ash waste contains low contaminated DCM / HMCM / PAHCM, the contractor shall avoid ash waste becoming airborne during demolition. General dust suppression measures shall be followed. The ash waste can be directly disposed of at a landfill site. 	Cremator room in Existing Crematorium / demolition	Contractor		✓	ProPECC PN 3/94 APCO															
S.6.9.10 - S.6.9.14	S.5.3.20 - S.5.3.24	Demolition, Handling, Treatment and Disposal of Moderately / Severely Contaminated DCM and Moderately / Severely Contaminated HMCM / PAHCM from Demolition of the Existing Crematorium <p><i>Site preparation procedures:</i></p>	Cremator room in Existing Crematorium / demolition	Contractor		✓	Waste Disposal (Chemical Waste) (General) Regulation															

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
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		<ul style="list-style-type: none"> ▪ Except the cremators/flue/chimney, all removable contaminated items shall be removed as far as practicable to avoid obstructing the decontamination activities. ▪ Preliminary site decontamination of all debris shall be carried out using High Efficiency Particulate Air (HEPA) vacuum cleaner. ▪ A chamber with three layers of polythene sheets shall enclose the top portion of the chimney above the roof. ▪ A 3-chamber decontamination unit shall be constructed at the entrance to the cremators/flues/chimney for entry and exit from the work area. It shall comprise a dirty room, a shower room and a clean room of at least 1m x 1m base with 3 layers of fire retardant polythene sheet. ▪ Workers shall carry out decontamination procedures before leaving the work area. ▪ All workers shall wear full protective equipment, disposable protective overall, nitrile gloves, rubber boots, and full-face positive pressure respirator. ▪ Warning signs in both Chinese and English shall be put up in conspicuous areas. <p><i>Site preparation procedures specific to severely contaminated DCM:</i></p> <ul style="list-style-type: none"> ▪ The walls, floor and ceiling of the cremator room shall be lined with 3-layers of fire retardant polythene sheets. ▪ Air movers shall be installed at the cremator room, and at the bottom of the chimney to exhaust air from the work area. A stand by air mover shall also be installed with each of the air movers. Sufficient air movement shall be maintained to give a minimum of 6 air changes per hour to the work area. 				ProPECC PN 3/94		
		<ul style="list-style-type: none"> ▪ New pre-filters and HEPA filters shall be used on the air movers. ▪ Before commencement of the decommissioning work a smoke test with non-toxic smoke shall be carried out to ensure the air tightness of the containment. <p><i>Demolition and handling procedures:</i></p> <ul style="list-style-type: none"> ▪ The cremators/flue/chimney shall be removed from top down. ▪ Scrubbing and HEPA vacuuming shall be used to remove any ash or residues attached to the cremators, flue, chimney and other building structures. ▪ Wastes generated from the contaminant or decontamination unit including the workers protection clothing shall be disposed of at landfill site. 				APCO		

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
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		<ul style="list-style-type: none"> ▪ After completion of removal, all surfaces shall be decontaminated by HEPA vacuum. ▪ If any contaminated wastewater needs to be discharged out of the site, it shall be properly treated to WPCO requirements with prior agreements with EPD on discharge standards. <p><i>Demolition and handling procedures specific to severely contaminated DCM:</i></p> <ul style="list-style-type: none"> ▪ The contaminated detached sections of the building structures shall be wrapped with 2 layers of fire retardant polythene sheets. A third layer shall be wrapped and secured with duct tape. Wet wiping shall be used to decontaminate the outer layer. ▪ After completion of removal and decontamination, spray the innermost layer of the fire retardant polythene sheet with PVA. Upon drying, peel off and dispose of at landfill site. Repeat for the other 2 layers disposing the final layer as contaminated wastes. <p><i>Treatment and disposal procedures:</i></p> <ul style="list-style-type: none"> ▪ Immobilise the ash waste by mixing with cement in the correct ratio as determined by pilot mixing and TCLP test. ▪ Place material in polythene lined steel drums for disposal at landfill. The drums should clearly be marked with "DANGEROUS CHEMICAL WASTE" in English and Chinese. Prior agreement of the disposal criteria must be obtained from EPD and the landfill operator. ▪ If the landfill disposal criteria cannot be met, disposal at the CWTC in Tsing Yi shall be considered. 						
S.6.9.1 - S.6.9.2	S.5.3.25 - S.5.3.7	<p>Chemical Waste</p> <ul style="list-style-type: none"> ▪ Should any chemical waste be generated, the Contractor must register with the EPD as chemical waste producer. ▪ All the chemical waste shall be handled according to the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. The chemical waste shall be stored and collected by an approved contractor for disposal at a licensed facility in accordance with the Waste Disposal (Chemical Waste) (General) Regulation. ▪ Principles of reuse and recycle chemical waste on site as far as practicable shall be adopted by the Contractor. 	Project site / demolition	Contractor		✓		<p>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes</p> <p>Waste Disposal (Chemical Waste) (General) Regulation.</p>

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
S.6.9.3	S.5.3.28	Containers used for the storage of chemical waste shall: <ul style="list-style-type: none"> Be suitable for the substance they are holding, resistant to corrosion, maintained in good condition, and securely closed. Have a capacity of less than 450 litres unless the specifications have been approved by the EPD. Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Waste Disposal (Chemical Waste) (General) Regulation. 						
S.6.9.4	S.5.3.29	The storage area for chemical waste shall: <ul style="list-style-type: none"> Be clearly labelled and used solely for the storage of chemical waste. Be enclosed on at least 3 sides. Have an impermeable floor and bunding, of capacity to accommodate 110% of the volume of the largest container or 20% by volume of the chemical waste stored in that area, whichever is the greatest. Have adequate ventilation. Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary). Be properly arranged so that incompatible materials are adequately separated. 						
S.6.9.25	S.5.3.30	Disposal of chemical waste shall be: <ul style="list-style-type: none"> Via a licensed waste collector. A facility licensed to receive chemical waste, such as the Chemical Waste Treatment Facility at Tsing Yi, which offers a chemical waste collection service and can supply the necessary storage containers. or A waste recycling plant approved by EPD. 						
S.6.7.27 - S.6.7.28	S.5.3.31 - S.5.3.32	General Refuse <ul style="list-style-type: none"> General refuse shall be stored in enclosed bins or compaction units separate from C&D and chemical wastes. A reputable waste collector shall be employed by the contractor to remove general refuse from the site, separately from C&D and chemical wastes, on a daily or every second day basis to minimise odour, pest and litter impacts. 	Project site / construction and demolition stages	Contractor		✓		

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
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		<ul style="list-style-type: none"> Individual collectors often recover aluminium cans from the waste stream if they are segregated or easily accessible. Therefore, separately labelled bins for their deposit shall be provided if feasible. Similarly, plastic bottles and carton package material generated on site shall be separated for recycling as far as possible. Site office waste shall be reduced through recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme shall be considered if one is available. 						
Waste Management (Operation Phase)								
S.6.8.16	S.5.3.33	<p>Ash and non-combustible residues</p> <ul style="list-style-type: none"> The disposal of bone ash and non-combustible residues shall be properly collected and handled to avoid dust emissions. In line with the current practices, the bone ash will be stored in covered containers for collection by the deceased's relatives within 2 months upon appointment and the non-combustible residues will be collected in sealed heavy-duty polythene bags for disposal at landfill. 	New Crematorium operation	FEHD			✓	
S.6.8.34	S.5.3.34	<p>Chemical Wastes</p> <ul style="list-style-type: none"> All the chemical wastes arising from the air pollution control system, machinery maintenance and servicing shall be collected by drum type container and removed by the licensed chemical waste contractor under the provisions of the Waste Disposal (Chemical Waste) (General) Regulations and in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes. The relevant measures provided in S.6.9.1 - S.6.9.5 shall also be followed. 	New Crematorium operation	FEHD			✓	<p>Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.</p> <p>Waste Disposal (Chemical Waste) (General) Regulation.</p>
S.6.8.35 - S.6.8.37	S.5.3.35 - S.5.3.36	<p>General Refuse</p> <ul style="list-style-type: none"> The general refuse shall be separated from any chemical wastes and stored in covered waste skips. Food and Environmental Hygiene Department (FEHD) shall remove general refuse from the site, separately from chemical wastes, on daily basis to minimise odour, pest and litter impacts. Burning of refuse must be strictly prohibited. Waste generated in offices shall be reduced through segregation and collection of recyclable waste materials (such as paper and carton packages) if the volumes are large enough to warrant collection. Participation in a local collection scheme shall be considered if one is available. 	New Crematorium operation	FEHD			✓	

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					D	C	O	
		<ul style="list-style-type: none"> To promote recycling of waste paper, aluminium cans and plastic bottles by the visitors clearly labelled recycling bins shall be placed at convenient locations within the New Crematorium area. A reliable waste-recycling agent shall be used to collect the items on a regular basis. 						
Waste Management (EM&A)								
S.11.2.17	S.5.3.10	Supplementary site investigations shall be conducted for asbestos in building structures and for dioxins, heavy metals and PAH in ash/particular matter samples.	<p>Cremators / flue / chimney and surrounding area.</p> <p>After decommissioning but prior to demolition</p>	Contractor		✓		<p>ProPECC PN 2/97 and 3/94</p> <p>AIR, AMP/AAP to be submitted under APCO</p> <p>Future Supplementary Investigation Site Plan</p>
Landscape and Visual (Construction Phase)								
S.7.9.2 MC 1	S.6.3.1	<p>Site offices and construction yards:</p> <ul style="list-style-type: none"> Site offices shall have olive green roof and façade coating or colour matches with existing environment. Site offices and the construction yard shall be decommissioned after construction. 	All site offices / Design and construction phases	ArchSD's Contractor	✓	✓		
S.7.9.2 MC 2	S.6.3.1	<p>Height of site offices:</p> <ul style="list-style-type: none"> The height of site offices, including the rooftop shall not exceed 10m. Building services equipment such as antennas may exceed 10m and shall be coated in black. 	All site offices / Design and construction phases	ArchSD's Contractor	✓	✓		
S.7.9.2 MC 3	S.6.3.1	<p>Hoarding and screening:</p> <ul style="list-style-type: none"> Where practical the site offices areas, construction yards and storage areas shall be screened using colour in harmony with the surrounding environment around the peripheries of the works area until the completion of relevant construction phases. 	All site offices and construction yard areas / Design and construction phases	ArchSD's Contractor	✓	✓		
S.7.9.2 MC 4	S.6.3.1	<p>Construction plant and building material:</p> <ul style="list-style-type: none"> Shall be orderly and carefully stored in order to appear neat and avoid visibility from outside where practical. 	Works site / Design and construction phases	ArchSD's Contractor	✓	✓		

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		<ul style="list-style-type: none"> ▪ Excess materials shall be removed from site as soon as practical. ▪ All construction plants shall be removed from site upon completion of construction works. 						
S.7.9.2 MC 5	S.6.3.1	<p>Construction light:</p> <ul style="list-style-type: none"> ▪ To be oriented away from the viewing location of VSRs. ▪ All lighting facing sensitive receiver shall have frosted diffusers and reflective covers. 	All construction lights / Design and construction phases	ArchSD's Contractor	✓	✓		
S.7.9.2 MC 6	S.6.3.1	<p>Silting trap</p> <ul style="list-style-type: none"> ▪ Silting traps shall be installed to minimise silting to streams. 	Streams / Construction phase	Contractor		✓		
S.7.9.3 MT 1	S.6.3.1	<p>Compensation for losses:</p> <ul style="list-style-type: none"> ▪ The tree compensation to tree loss ratio shall be at least 1:1 in term of quantity. 	Within the Wo Hop Shek Crematorium	ArchSD's Contractor	✓	✓		ETWB TCW No. 2/2004 ETWB TCW No. 3/2006
S.7.9.3 MT 2	S.6.3.1	<ul style="list-style-type: none"> ▪ Where practical, trees that require removal shall be transplanted on Site. 	Work site / Design and construction phases	ArchSD's Contractor	✓	✓		ETWB TCW No. 2/2004 ETWB TCW No. 3/2006
S.7.9.3 MT 3	S.6.3.1	<p>Amenity planting:</p> <ul style="list-style-type: none"> ▪ Planting works shall be carried out under the supervision of a specialist landscape sub-contractor. ▪ The rooftop of the cremation plant room shall be planted with lawn. ▪ Open spaces shall be included Project. ▪ Screen planting such as planting a roll of trees along the site boundary butting Kiu Tau Road shall be carried out. ▪ New trees, shrubs and groundcover shall be carefully selected and designed to homogenize with the environment. 	As shown on mitigation measure plans / All phases	ArchSD's & FEHD's Contractor	✓	✓	✓	ETWB 2/2004
S.7.9.3 MT 4	S.6.3.1	<p>Woodland mix planting:</p> <ul style="list-style-type: none"> ▪ Woodland mix, comprising of tree seedlings and shrubs, shall be planted within the Wo Hop Shek Cemetery to enhance the ecological value and compensatory of tree loss. 	Within the Wo Hop Shek Cemetery / All phases	ArchSD's Contractor	✓	✓		ETWB TCW No. 2/2004 ETWB TCW No. 3/2006
S.7.9.3 MT 5	S.6.3.1	<p>Preservation:</p> <ul style="list-style-type: none"> ▪ No tree shall be transplanted or felled without prior approval by relevant Government departments. 	Work site / All phases	ArchSD's Contractor	✓	✓		ETWB TCW No. 2/2004 ETWB TCW No.

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		<ul style="list-style-type: none"> ▪ All trees that are marked for retention shall be fenced off with a 1.2m high fence around the dripline of trees or larger area as far as feasible. ▪ Transplant preparation works shall be carried as soon as possible after commencement of construction. Over-pruning such as hard pruning of tree crown, pollarding or topping shall be avoided. Rootball and crown pruning shall be carried out over at least 3 months. ▪ Existing shrub and ground cover planting areas that will not be removed shall be maintained in good condition and enhanced where practical. 						3/2006	
S.7.9.4 MB 1	S.6.3.1	The 10m height headroom cremation plant room shall be half sunken to reduce the visual impact to pedestrians.	Cremation plant room / Design phase	ArchSD's Contractor	✓	✓			
S.7.9.4 MB 2	S.6.3.1	The chimney shall be designed to have sculptural outlook and articulated.	Chimney / Design phase	ArchSD's Contractor	✓	✓			
S.7.9.4 MB 3:	S.6.3.1	The chimney stacks shall be designed to locate at the least conspicuous location of the site to VSRs.	Chimney / Design phase	ArchSD's Contractor	✓	✓			
Landscape and Visual (EM&A)									
S.11.2.23 - S.11.2.24	S.6.2	Details of the inspection frequency and parameters will be outlined in the EM&A Manual.	Work site / Construction	Contractor		✓			
Water Quality (Construction Phase)									
S.8.7.1 to S.8.7.4	S.7.2.2	<p>Construction Runoff and Drainage</p> <ul style="list-style-type: none"> ▪ Wastewater shall be properly treated to meet the discharge standards set out in the relevant Water Pollution Control Ordinance (WPCO) discharge licence. No direct discharge of site runoff into the two streams shall be allowed. ▪ Provision of perimeter channels to intercept storm runoff from outside the Site. These shall be constructed in advance of site formation works and earthworks. ▪ Sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided to remove sand/silt particles from runoff to meet the requirements of the Technical Memorandum standard under the WPCO. ▪ Works shall be carefully programmed to minimise soil excavation works during rainy seasons. ▪ Exposed soil surface shall be protected by paving as soon as possible to reduce the potential of soil erosion. 	Work site / Construction	Contractor		✓		ProPECC PN 1-94 & WPCO	

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		<ul style="list-style-type: none"> ▪ Temporary access roads shall be protected by crushed gravel and exposed slope surfaces shall be protected when rainstorms are likely to occur. ▪ Trench excavation shall be avoided in the wet season as far as practicable, and if necessary, these trenches shall be excavated and backfilled in short sections. ▪ Open stockpiles of construction materials on Site shall be covered with tarpaulin or similar fabric during rainstorms. ▪ Sand and silt in the wash water from the wheel from the wheel washing facility shall be settled out and removed before discharging into the storm drain. ▪ Oil receptor shall be provided in the drainage system and regularly emptied to prevent the release of oil and grease into the storm drainage system after accidental spillage. 						
S.8.7.5	S.7.2.3	<p>General Construction Activities</p> <ul style="list-style-type: none"> ▪ Debris and rubbish generated on Site shall be collected, handled and disposed of properly to avoid them entering the two streams. ▪ All fuel tanks and storage areas shall be provided with locks and be sited on sealed areas, within bunds of a capacity equal to 110% of the storage capacity of the largest tank. ▪ Open storm water drains and culverts near the works area shall be covered to block the entrance of large debris and refuse. 	Work site / Construction phase	Contractor		✓		ProPECC PN 1-94 & WPCO
S.8.7.6	S.7.2.4	<p>Sewage from On-site Workforce</p> <ul style="list-style-type: none"> ▪ Portable chemical toilets shall handle the sewage from construction work force if the existing toilets in the Site are not adequate. Licensed contractors who shall be responsible for appropriate disposal and maintenance of these facilities shall provide appropriate and adequate portable toilets. 	Work site / Construction phase	Contractor		✓		WPCO
S.8.7.7	S.7.2.5	<p>Groundwater</p> <ul style="list-style-type: none"> ▪ Sheet piling shall be provided at suitable location around the basement excavation to reduce the effect of lowering the water table from any dewatering process. Any discharge of groundwater pumped out from any dewatering process of the construction works shall be treated to comply with the standards set in the relevant discharge licence prior discharge. No discharge of the groundwater shall be allowed into the two streams. 	Work site / Construction phase	Contractor		✓		WPCO
Ecology (Construction Phase)								
S.9.8.3 -	S.8.3.1	Mitigation to minimise impacts on habitat and vegetation loss:	Work site	Arch SD /	✓	✓		ETWB Technical

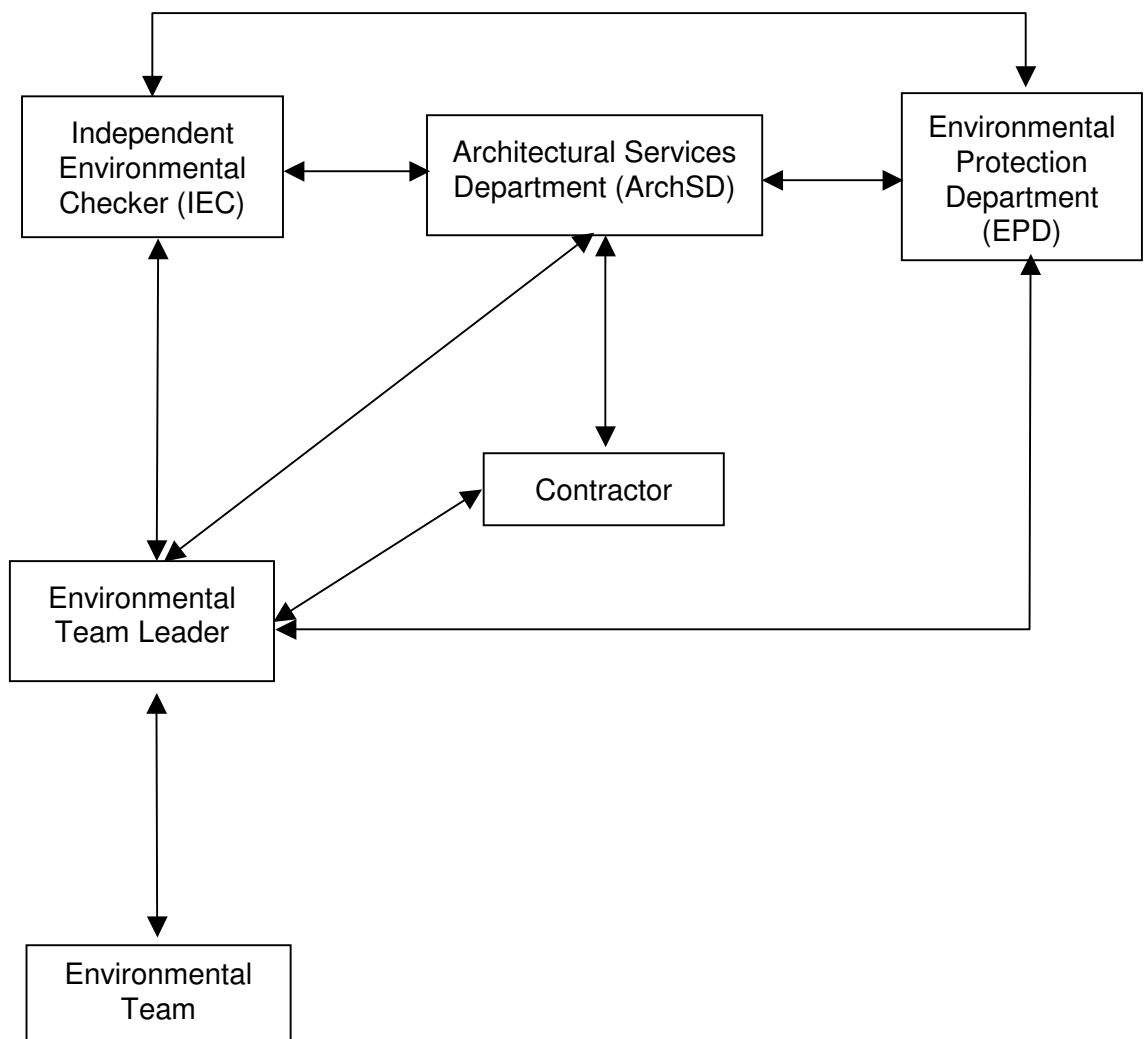
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					D	C	O	
S.9.8.13		<ul style="list-style-type: none"> ▪ Layout of the Project shall be carefully designed to avoid or minimise the area of habitat loss and the numbers to trees to be felled. ▪ All trees shall be preserved as far as possible, especially species of conservation concern. Recommendations to be provided in the Tree Survey Report to mitigate impacts on trees shall be followed. ▪ Disturbance of individuals of the shrub / tree Transplantation of the two shrub / tree species of conservation concern, namely <i>Aquilaria sinensis</i> and <i>Cibotium barometz</i>, shall be avoided. Where loss of these species would be unavoidable, it is recommended to transplant them to same habitats with similar conditions. Following transplantation, regular monitoring of these trees shall be conducted by a suitable qualified botanist / horticulturist over a 12-month period. ▪ Transplantation of any affected trees to grassland / scrubland within the Wo Hop Shek Cemetery. ▪ Compensatory planting of the felled trees shall follow the Technical Circular No. 3/2006 issued by ETWB. 	particularly semi-natural woodland / Design and construction phases.	Contractor				Circular No. 3/2006
S.9.8.15 - S.9.8.16	S.8.3.1	<p>Mitigation to construction runoff through general good site practice:</p> <ul style="list-style-type: none"> ▪ Temporary access to the work sites shall be carefully planned and located to minimise disturbance caused to the streams and nearby habitats. ▪ Use of less or smaller construction plant may be specified to reduce disturbance to the streams and nearby habitats. ▪ Temporary sewage system shall be designed and installed to collect wastewater and prevent it from entering the streams and nearby habitats. <ul style="list-style-type: none"> ▪ The Site inside or in the proximity of the streams and nearby habitats shall be temporarily isolated, such as by placing of sandbags or silt curtains with lead edge at bottom and properly supported props, to prevent adverse impacts on these areas. ▪ Natural bottom and existing flow in the streams shall be preserved as much as possible to avoid disturbance to the stream habitats. ▪ Proper locations well away from the streams and nearby habitats for temporary storage of materials (e.g. equipment, filling materials, chemicals and fuel) and temporary stockpile of construction debris and spoil shall be identified before commencement of the works. ▪ Stockpiling of construction materials, if necessary, shall be properly covered and located away from the streams and nearby habitats. 	Work site / Construction phase	Contractor		✓		ETWB Technical Circular (Works) No. 5/2005.

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
		<ul style="list-style-type: none"> ▪ Construction debris and spoil shall be covered up and/or properly disposed of as soon as possible to avoid being washed into the streams and nearby habitats by rain. ▪ Construction effluent, site runoff and sewage shall be properly collected and/or treated. ▪ Proper locations for discharge outlets of wastewater treatment facilities well away from the streams and nearby habitats shall be identified. ▪ Vehicles and other plant shall be carefully maintained and properly used to minimise the chance for accidental spillage. ▪ Any spillages that do occur shall be quickly identified and appropriately cleaned up before they can contaminate streams or groundwater. ▪ Temporary geo-textile silt fences around earth moving works shall be erected to trap any sediments being washed away and prevent them from entering surrounding areas. ▪ Silt traps shall be installed at points where drainage from the Site enters temporary sewage system. ▪ Exposed soil or other loose materials shall be covered with tarpaulins to prevent erosion, and then seeded and covered with a biodegradable geo-textile blanket for erosion control purposes. 						
S.9.8.18		<p>Mitigation to protect the groundwater:</p> <ul style="list-style-type: none"> ▪ Basement formation or any construction activities likely to pump out a large quantity of groundwater shall be protected with sheet-piling at suitable locations around the basement footprint, or by any like method. ▪ No groundwater shall be pumped back to the two stream courses to protect the natural integrity of the stream habitat and the associated organism. 	Work site / Construction phase	Contractor		✓		
S.9.8.20	S.8.3.1	<p>Mitigation for noise and other disturbance on ecological integrity:</p> <ul style="list-style-type: none"> ▪ Use of sturdy 1.8 metres protective fencing shall be located at the edge of the tree canopy but not around the trunk. ▪ Works beneath the tree canopy shall be avoided: If encroachment under the canopy area is unavoidable, adequate protections shall be provided to ensure no damage of any part of the tree would occur due to the encroachment. ▪ An approved Landscape Contractor shall implement any tree transplanting and planting works. Quality control of the work shall be undertaken by a qualified Landscape Architect through site inspections and approval of works. 	Work site / Construction phase	Contractor		✓		

EIA Ref	EM&A Ref.	Environmental Protection Measures / Mitigation Measures	Location / Timing	Implementation Agent	Implementation Stages*			Relevant Legislation and Guidelines
					D	C	O	
		<ul style="list-style-type: none"> ▪ Construction works shall be restricted to works area which are clearly defined. ▪ Woodland or other habitats that would be affected by the construction works shall be well-defined and minimised. ▪ Human inference to habitats beyond the site boundary and habitats proposed to be retained shall be avoided by providing temporary barricades. ▪ Works area shall be reinstated immediately after completion of the construction. ▪ Waste and other garbage generated during the construction of the proposed development shall be dumped properly. ▪ Uncontrolled fire shall be strictly prohibited. Appropriate fire control measures shall be provided in order to protect nearby habitats. 						
Ecology (EM&A)								
S.9.11 & S.11.2.29	S.8.2.1	<p>Audit/Inspection:</p> <ul style="list-style-type: none"> ▪ Regular site audit / inspection shall be conducted at least once a week to inspect the implementation of the recommended mitigation measures (details to be outlined in the EM&A Manual). 	Work site / Construction phase	Contractor		✓		
S.11.2.32 - S.11.2.33	S.8.2.2 - S.8.2.4	<p>Monitoring on Transplantation:</p> <ul style="list-style-type: none"> ▪ Trees requiring transplantation or protection shall be identified based on the information illustrated in the Tree Survey Report. ▪ Regular monitoring after transplantation of <i>Aquilaria sinensis</i> and <i>Cibotium barometz</i> individuals shall be conducted to check on the health and conditions of the plants. Monitoring shall cover the 12-month period following transplantation. The monitoring shall be conducted by a suitably qualified botanist / horticulturist at least twice a month for the first four months after transplantation, and once a month for the remaining eight months. 	Work site / Construction phase	Contractor		✓		

Note: * D = Design, C = Construction, O = Operation

Appendix B EM&A Organisation



↔ Line of Communication

Appendix C Air Quality Monitoring Field Log Sheet

TSP Monitoring – Sample Data Sheet

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time	Start (min.)	
Meter Reading	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Qsi	Pi (mmHg)	
	Ti (°C)	
	Hi (in.)	
	Qsi (Std. m ³)	
Final Flow Rate, Qsf	Pf (mmHg)	
	Tf (°C)	
	Hf (in.)	
	Qsf (Std. m ³)	
Average Flow Rate (Std. m ³)		
Total Volume (Std. m ³)		
Filter Identification No.		
Initial Wt. of Filter(g)		
Final Wt. of Filter (g)		
Measured TSP Level (µg/m ³)		

	Name & Designation	Signature	Date
Field Operator:			
Laboratory Staff:			

Appendix D Sample Template for Interim Notification

Incident Report on Action Level or Limit Level Non-compliance

Project	
Date	
Time	
Monitoring Location	
Parameter	
Action & Limit Levels	
Measured Level	
Possible reason for Action or Limit Level Non-compliance	
Actions taken / to be taken	
Remarks	

Prepared by: _____

Designation: _____

Signature: _____

Date: _____