

Issue No. : 1
Issue Date : May 2014
Project No. : 912

**PROVISION OF CREMATORS AT
WO HOP SHEK CREMATORIUM**

**QUARTERLY ENVIRONMENTAL
MONITORING & AUDIT REPORT
(FEBRUARY 2014 – MARCH 2014)**

Prepared By:

ALLIED ENVIRONMENTAL CONSULTANTS LTD.

COMMERCIAL-IN-CONFIDENCE

ANewR

Architectural Services Department
Architectural Branch
41/F, Queensway Government Offices
66 Queensway
Hong Kong

Your reference:

Our reference: HKASD101/50/102200

Date: 22 May 2014

Attention: Mr Peter Lau

BY FAX ONLY
(Fax no.: 2524 7981)

Dear Sirs

Quotation Contract No. 9/2009/AB1
Provision of Cremators at Wo Hop Shek Crematorium – Independent Environmental Checker Service
Quarterly EM&A Report (February 2014 – March 2014)

We refer to the e-mail from the Environmental Team on 9 May 2014 attaching a copy of the above report. We have no comment and, hereby, endorse the report.

Should you have any queries, please do not hesitate to contact our Mr Adi Lee on 2618 2836.

Yours faithfully
ANewR CONSULTING LIMITED



Andy W L Chung
Managing Director

AC/LYMA/csym

cc AEC – Ms Grace Kwok (Fax: 2815 5399)

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Certified by:



Grace M. H. Kwon
Environmental Team Leader

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This report has been prepared by Allied Environmental Consultants Limited with all reasonable skill, care and diligence within the terms of the Agreement with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

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EXECUTIVE SUMMARY

Allied Environmental Consultants Limited (AEC) has been appointed to conduct an environmental monitoring and audit (EM&A) program for the Provision of Cremators at Wo Hop Shek Crematorium (the “Project”). The construction works of the Project commenced on 1st November 2009. This report is the eighteenth quarterly EM&A report, which summarizes the environmental monitoring and audit results recorded during the period from 1st February 2014 to 18th March 2014. Termination of EM&A was notified and approved by EPD on 19th March 2014.

Based on the monitoring results, the air quality and construction noise levels during the reporting quarter complied with the environmental requirements in EM&A Manual. There were no environmental complaints received in this reporting quarter. No notification of summons or prosecution was received.

Construction activities undertaken in this report period include rectification works for defects; site formation works for Site B; Demolition work for the skeletal building at Site B; construction work for Site B and landscape work for Site B. Potential environmental impacts include dust generation from plastering, drilling, material transfer, demolition works, touch up works and vehicular movement; noise from demolition, site formation, building services works and touch up works; wastewater generated from spraying water; and generation of various wastes including C&D and general refuse. The Contractor should properly implement environmental mitigation measures as per the implementation schedule in the EM&A manual to ensure no adverse environmental impacts to be arisen from the construction works. The Contractor is also reminded to maintain good housekeeping at the site.

1. PROJECT BACKGROUND

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.

As the five existing cremators had approached the end of their serviceable life, the Food and Environmental Hygiene Department (FEHD) proposed to demolish the existing coffin crematorium and the skeletal cremator building and to construct in-situ a new crematorium in the same site.

An Environmental Impact Assessment (EIA) was carried out for the Provision of Cremators at Wo Hop Shek Crematorium (hereafter referred to as the "Project") and the EIA Report was approved by Environmental Protection Department (EPD) in June 2008. The Environmental Permit (EP-329/2009) for the Project was issued by EPD in February 2009.

The locations of project site and air sensitive receivers are shown in **Figure 1**. The construction phase is divided in the three phases as outlined below:

Phase I (Year 2009 to Year 2011)

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)

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)

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

In July 2009, Architectural Services Department (ArchSD) as the works agent has awarded the construction contract of the Project to Wan Chung Construction Co. Ltd. ("the Contractor"). The Contractor has appointed Allied Environmental Consultants Limited (AEC) as the Environmental Team (ET) to undertake Environmental Monitoring and Audit (EM&A) programme in accordance with the EM&A Manual under the approved EIA report, which details the EM&A requirements for the construction and operation of the Project, and the EP-329/2009.

The Construction Programme of the Project is shown in Appendix A. The construction works commenced on 1st November 2009. Phase I of the project, including Section 1 and Section 1(remaining part) & Section 3 were substantially completed on 4th September 2012 and 25th October 2012 respectively. Phase II of the project, including Section 2 and Section 4 were substantially completed on 15 November 2013. Termination of EM&A was notified and

approved by EPD on 19th March 2014. This report is the eighteenth quarterly EM&A report, which details the EM&A results recorded during the period from 1st February 2014 to 18th March 2014.

1.1 Project Organization and Contact Personnel

Key personnel and contact particulars are summarized in *Table 1*.

Role	Department / Company	Names	Contact Number	Fax Number
Environmental Permit Holder	Food and Environmental Hygiene Department	Ms. Karen Sin	3141 1226	3101 0450
Architect	Architecture Services Department	Mr. Andrew Nam	2867 3662	2290 2170
Main Contractor	Wan Chung Construction Co., Limited	Mr. Murphy Kuan	9210 3154	2676 7966
Environmental Team Leader	Allied Environmental Consultants Limited	Ms. Grace Kwok	2815 7028	2815 5399
Independent Environmental Checker	ANewR Consulting Limited	Mr. Andy Chung	2869 6018	3007 8556

Table 1 Contact Details of Key Personnel

2. CONSTRUCTION WORKS & PROGRAMME

The major works undertaken and/or completed during the reporting quarter are listed below:

- Nil

Figure 2 shows the works undertaken during the reporting quarter and *Table 2* shows the interrelationship between construction activities and environmental mitigation measures in the reporting quarter.

Construction Works	Major Environmental Impact	Mitigation Measures
Nil	-	-

Table 2 Interrelationship between Construction Activities and Mitigation Measures

3. SUMMARY OF EM&A REQUIREMENT

For regular impact monitoring, the sampling frequency of at least once in every six-days, was strictly observed at the monitoring station for 24-hr TSP monitoring. For 1-hr TSP monitoring, the sampling frequency of at least three times in every six-days was undertaken when the highest dust impact occurs.

From baseline monitoring results, the Action and Limit Levels for air quality are summarized in **Table 3**.

Parameters	Monitoring Location	Baseline Level ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
24-Hour TSP Level	A22a	42.0	157.3	260
	A22b	41.6	157.0	260
1-Hour TSP Level	A22a	48.8	281.7	500
	A22b	46.8	280.4	500

Table 3 Action and Limit Level for Air Quality Impact Monitoring

Should non-compliance of the above Action and Limit levels occurs, actions in accordance with the Event and Action Plan in **Table 4** should be carried out.

Event	Action			
	ET	IEC	AR	Contractor
Action Level				
Exceedance for one sample	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.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable practice; 2. Amend working methods if appropriate.
Exceedance for two or more consecutive samples	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	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.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	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
	with IEC and AR; 8. If exceedance stops, cease additional monitoring.			
Limit Level				
Exceedance for one sample	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.	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.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	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.
Exceedance for two or more consecutive samples	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 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.	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.	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 that portion of work until the exceedance is abated.	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

Table 4 Event and Action Plan

4. AIR QUALITY MONITORING

4.1 Air Quality Monitoring Methodology

TSP levels in 1-hour and 24-hour were measured to indicate the impacts of construction dust on air quality. TSP levels were 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). 1-hour TSP samples were taken three times a day between 0700-1900 hours. 24-hour TSP samples were taken every six days.

4.2 Monitoring Equipment

High Volume Sampler (HVS) in compliance with the specifications of section 2.2.1 of the EM&A Manual was used for carrying out the 1-hour and 24-hour TSP monitoring at the designated location. The model number of the HVSs is Anderson GMWS-2310 ACCU-VOL.

The HVSs are equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. The flow rate of each HVS with mass flow controller is calibrated using an orifice calibrator. Initial calibration of dust monitoring equipment is conducted upon installation and prior to commissioning. Five point calibration is carried out every two months. The Calibration Certificates of the High-Volume TSP Sampler are given in **Appendix A**. The weighing of the filter paper was undertaken by SGS Hong Kong Limited.

Wind data monitoring equipment was set up on 30 November 2009 and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. Installation and operation of wind data monitoring equipment followed the followings:

- Wind sensors were 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 were 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 is divided into 16 sectors of 22.5 degrees each.

Weather data were obtained from the on-site wind stations in the reporting quarter.

4.3 Air Quality Monitoring Location

1-hour and 24-hour TSP monitoring were conducted to monitor the air quality. Air quality monitoring was conducted at two designated air quality monitoring locations during construction phase: (i) 83 Wo Ka Lau Road (A22a) and (ii) 51D Wo Hop Shek San Tsuen (A22b) as shown in **Figure 2**. Details of the two air quality monitoring stations are shown in **Table 5**.

ID	Monitoring Location	Description of Monitoring Location
A22a	83 Wo Ka Lau Road	G/F at the front gate of 83 Wo Ka Lau Road
A22b	51D Wo Hop Shek San Tsuen	G/F boundary wall of house 51D of Wo Hop Shek San Tsuen

Table 5 Descriptions of Air Quality Monitoring Locations

5. RESULTS

5.1. Air Quality

No exceedance was recorded in this quarter. Summary and graphical plots of air quality monitoring record of 1-hour TSP levels and 24-hour TSP levels are given in **Appendix B** and **Appendix C**.

5.2. Weather Conditions

Weather data were obtained from the on-site wind stations in the reporting quarter. **Table 6** summarizes the wind data during the monitoring dates. Wind data records from the on-site wind stations are shown in **Appendix D**.

Date	Weather	Prevailing Wind Direction	Daily Average Wind Speed (m/s)
5 February 2014	Cloudy	ESE	2.56
11 February 2014	Cloudy	W	2.60
17 February 2014	Cloudy	SE	1.10
22 February 2014	Cloudy	E	2.15
28 February 2014	Fine	SSE	2.92
6 March 2014	Cloudy	E	3.28
12 March 2014	Cloudy	ESE	2.14
18 March 2014	Fine	ENE	0.57

Table 6 Summary of Weather Conditions during the Monitoring Period

6. SITE INSPECTION & AUDIT AND IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

Weekly site inspections were carried out by representatives of the ET. A total of six site inspections were conducted by the ET in this reporting quarter. Observations by the ET, actions by the Contractor and outcome are summarized in the **Table 7**.

Date	Observations	Action taken by Contractor	Outcome
7 February 2014	No major environmental deficiency.	-	-
14 February 2014	No major environmental deficiency.	-	-
21 February 2014	No major environmental deficiency.	-	-
27 February 2014 [Environmental site audit was carried out jointly with IEC]	No major environmental deficiency.	-	-
7 March 2014	No major environmental deficiency.	-	-
14 March 2014	No major environmental deficiency.	-	-

Table 7 Summary of Site Inspections

During site inspections in the reporting quarter, no non-conformance of implementation of environmental mitigation measures was identified. All environmental mitigation measures for construction stages as stated in approved EIA Report, EM&A Manual and EP-329/2009 were carried out properly in the reporting quarter. The implementation status of environmental mitigation measure was summarized in **Appendix E**.

7. LANDSCAPE AND VISUAL IMPACTS

A total of three landscape and visual impact inspections were carried out on 7th and 21st February 2014 and 7th March 2014. No deficiency was observed in this reporting quarter. The ecological monitoring was completed in August 2010.

8. NON-COMPLIANCE, COMPLAINTS, NOTIFICATIONS OF SUMMONS AND SUCCESSFUL PROSECUTIONS

In this reporting quarter, no complaints, inspection notices, and notifications of summons or prosecution were received.

Cumulative statistics of Notification of Summons and Successful Prosecutions are shown in **Table 8**.

Notification of Summons		Successful Prosecution	
February 2014 to March 2014	Cumulative	February 2014 to March 2014	Cumulative
0	0	0	1

Table 8 Cumulative Statistics of Notification of Summons and Successful Prosecutions

9. WASTE MANAGEMENT

In the reporting quarter, no general refuse was disposed of to North East New Territories Landfill; no inert C&D waste was disposed of to Tuen Mun Area 38 Fill Bank. No timber, metals, paper/cardboard packaging and plastics were generated/ recycled in the reporting quarter. No chemical waste was transported off site to Chemical Waste Treatment Centre in Tsing Yi in this reporting period.

10. RECOMMENDATIONS AND CONCLUSIONS

10.1. Recommendations

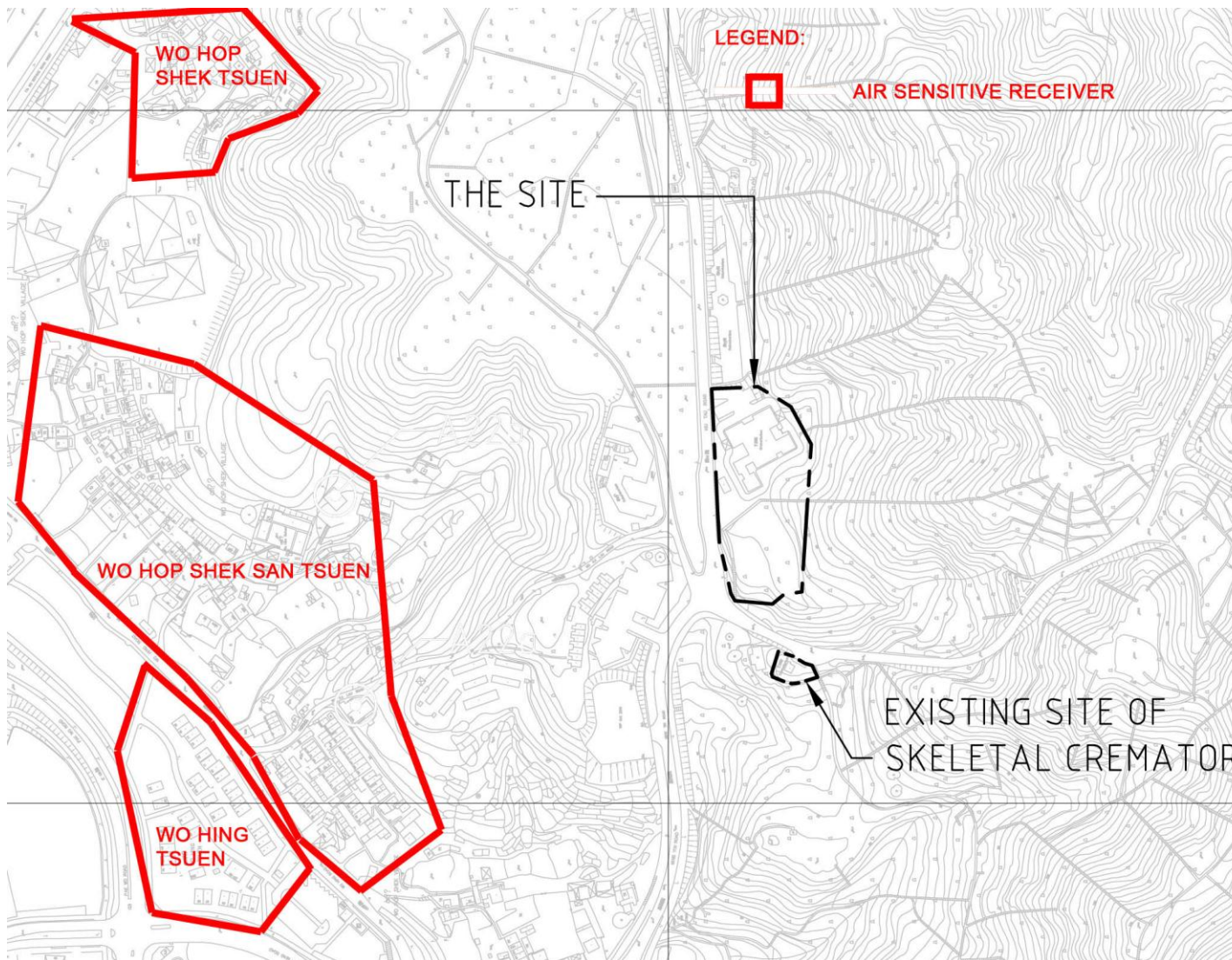
In accordance with the environmental site audits undertaken during the reporting quarter, no recommendation was advised.

The ET shall strictly follow the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

10.2. Conclusions

The construction works commenced on 1st November 2009. Phase I of the project, including Section 1 and Section 1(remaining part) & Section 3 were substantially completed on 4th September 2012 and 25th October 2012 respectively. Phase II of the project, including Section 2 and Section 4 were substantially completed on 15th November 2013. Termination of EM&A was notified and approved by EPD on 19th March 2014. This report is the quarterly EM&A report, which details the EM&A results recorded during the period from 1st February 2014 to 18th March 2014. Environmental monitoring was carried out for the Provision of Cremators at Wo Hop Shek Crematorium in the reporting quarter. 1-hour and 24-hour TSP air quality monitoring were conducted at (i) 83 Wo Ka Lau Road (A22a) and (ii) 51D Wo Hop Shek San Tsuen (A22b) during the construction period.

All monitoring results complied with the relevant action and limit levels. No environmental complaints and notification of summons or prosecution were received during the reporting quarter.



PROVISION OF CREMATORS AT WO HOP SHEK CREMATORIUM AT KIU TAU ROAD
SITE LOCATION PLAN

Figure No.

1

Rev.

0

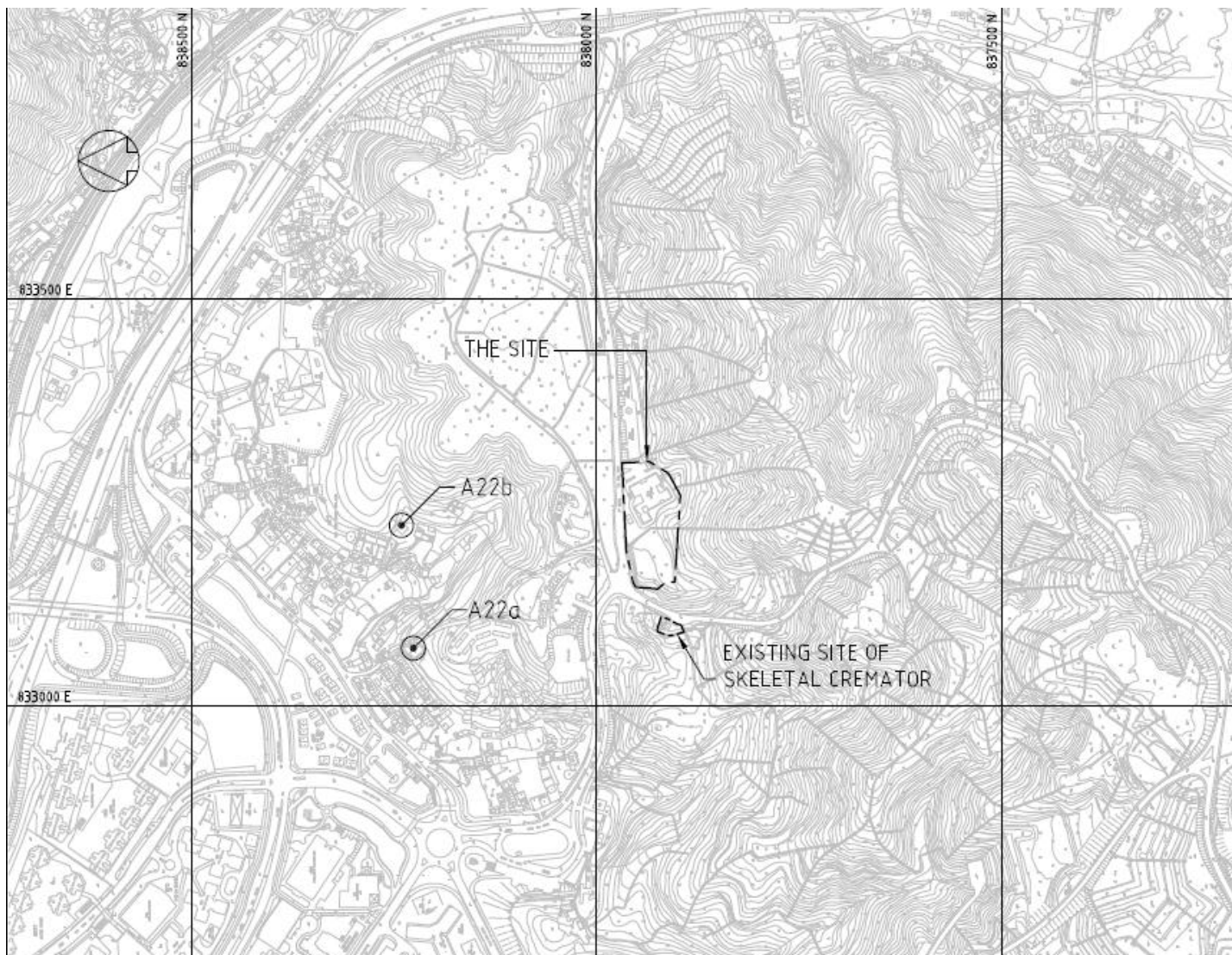
Scale

NTS

Date

2/10





PROVISION OF CREMATORS AT WO HOP SHEK CREMATORIUM AT KIU TAU ROAD
LOCATION OF AIR QUALITY MONITORING STATION

Figure No.

2

Rev.:

0

Scale

NTS

Date

2/10





Ground floor within the front gate of 83 Wo Ka Lau Road



Ground floor boundary wall of house 51D of Wo Hop Shek San Tsuen

PROVISION OF CREMATORS AT WO HOP SHEK CREMATORIUM AT KIU TAU ROAD
PHOTOS OF AIR QUALITY MONITORING STATION

Figure No.	Rev.:
3	0
Scale	Date
NTS	2/10



Appendix A

Calibration Record of High-Volume TSP Sampler

High-Volume TSP Sampler
5-Point Calibration Record

Location : A1,(Fanling)
Calibrated by : K.T.Ho
Date : 2/01/2014

Sampler

Model : GMWS-2310 ACCU-VOL
Serial Number : S/N 1059

Calibration Office and Standard Calibration Relationship

Serial Number : 2454
Service Date : 12 Mar 2013
Slope (m) : 2.05818
Intercept (b) : 0.01929
Correlation Coefficient(r) : 0.99991

Standard Condition

Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1015
Ta(K) : 292

Zero Error of Sampler Flow Rate Indication

IO : 0.0

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (indicated flow)	Y
1	18 holes	11.5	3.437	1.660	69	69.93
2	13 holes	9.5	3.124	1.508	61	61.82
3	10 holes	7.4	2.757	1.330	52	52.70
4	7 holes	4.8	2.220	1.069	41	41.55
5	5 holes	2.9	1.726	0.829	30	30.40

Sampler Calibration Relationship

Slope(m):47.056 Intercept(b): -8.927 Correlation Coefficient(r): 0.9992

Checked by: Magnum Fan

Date: 11/01/2014

High-Volume TSP Sampler
5-Point Calibration Record

Location : A2 (Fanling)
Calibrated by : K.T.Ho
Date : 2/01/2014

Sampler

Model : GMWS-2310 ACCU-VOL
Serial Number : S/N4944

Calibration Office and Standard Calibration Relationship

Serial Number : 2454
Service Date : 12 Mar 2013
Slope (m) : 2.05818
Intercept (b) : 0.01929
Correlation Coefficient(r) : 0.99991

Standard Condition

Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1015
Ta(K) : 292

Zero Error of Sampler Flow Rate Indication

IO : 0.0

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	11.3	3.407	1.646	61	61.82
2	13 holes	9.2	3.074	1.484	54	54.73
3	10 holes	7.1	2.700	1.303	48	48.65
4	7 holes	4.6	2.174	1.047	37	37.50
5	5 holes	2.7	1.665	0.800	28	28.38

Sampler Calibration Relationship

Slope(m): 39.508 Intercept(b): -3.402 Correlation Coefficient(r): 0.9994

Checked by: Magnum Fan

Date: 11/01/2014

High-Volume TSP Sampler
5-Point Calibration Record

Location : A1,(Fanling)
Calibrated by : K.T.Ho
Date : 3/03/2014

Sampler

Model : GMWS-2310 ACCU-VOL
Serial Number : S/N 1059

Calibration Office and Standard Calibration Relationship

Serial Number : 2454
Service Date : 12 Mar 2013
Slope (m) : 2.05818
Intercept (b) : 0.01929
Correlation Coefficient(r) : 0.99991

Standard Condition

Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1017
Ta(K) : 299

Zero Error of Sampler Flow Rate Indication

IO : 0.0

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC (indicated flow)	Y
1	18 holes	12.8	3.579	1.729	70	70.02
2	13 holes	10.0	3.163	1.528	60	60.018
3	10 holes	7.6	2.758	1.330	50	50.01
4	7 holes	5.0	2.237	1.077	40	40.01
5	5 holes	3.2	1.789	0.860	30	30.01

Sampler Calibration Relationship

Slope(m):45.60 Intercept(b): -9.498 Correlation Coefficient(r): 0.9995

Checked by: Magnum Fan

Date: 11/03/2014

High-Volume TSP Sampler
5-Point Calibration Record

Location : A2 (Fanling)
Calibrated by : K.T.Ho
Date : 3/03/2014

Sampler

Model : GMWS-2310 ACCU-VOL
Serial Number : S/N4944

Calibration Office and Standard Calibration Relationship

Serial Number : 2454
Service Date : 12 Mar 2013
Slope (m) : 2.05818
Intercept (b) : 0.01929
Correlation Coefficient(r) : 0.99991

Standard Condition

Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition

Pa (hpa) : 1017
Ta(K) : 299

Zero Error of Sampler Flow Rate Indication

IO : 0.0

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	11.6	3.407	1.646	64	64.02
2	13 holes	9.4	3.067	1.481	56	56.02
3	10 holes	7.4	2.721	1.313	50	50.01
4	7 holes	4.8	2.192	1.055	40	40.01
5	5 holes	3.0	1.733	0.832	30	30.01

Sampler Calibration Relationship

Slope(m): 40.900 Intercept(b): -3.752 Correlation Coefficient(r): 0.99950

Checked by: Magnum Fan

Date: 11/03/2014

Appendix B

*Summary and Graphical Plot of 1-Hour TSP
Monitoring Record*

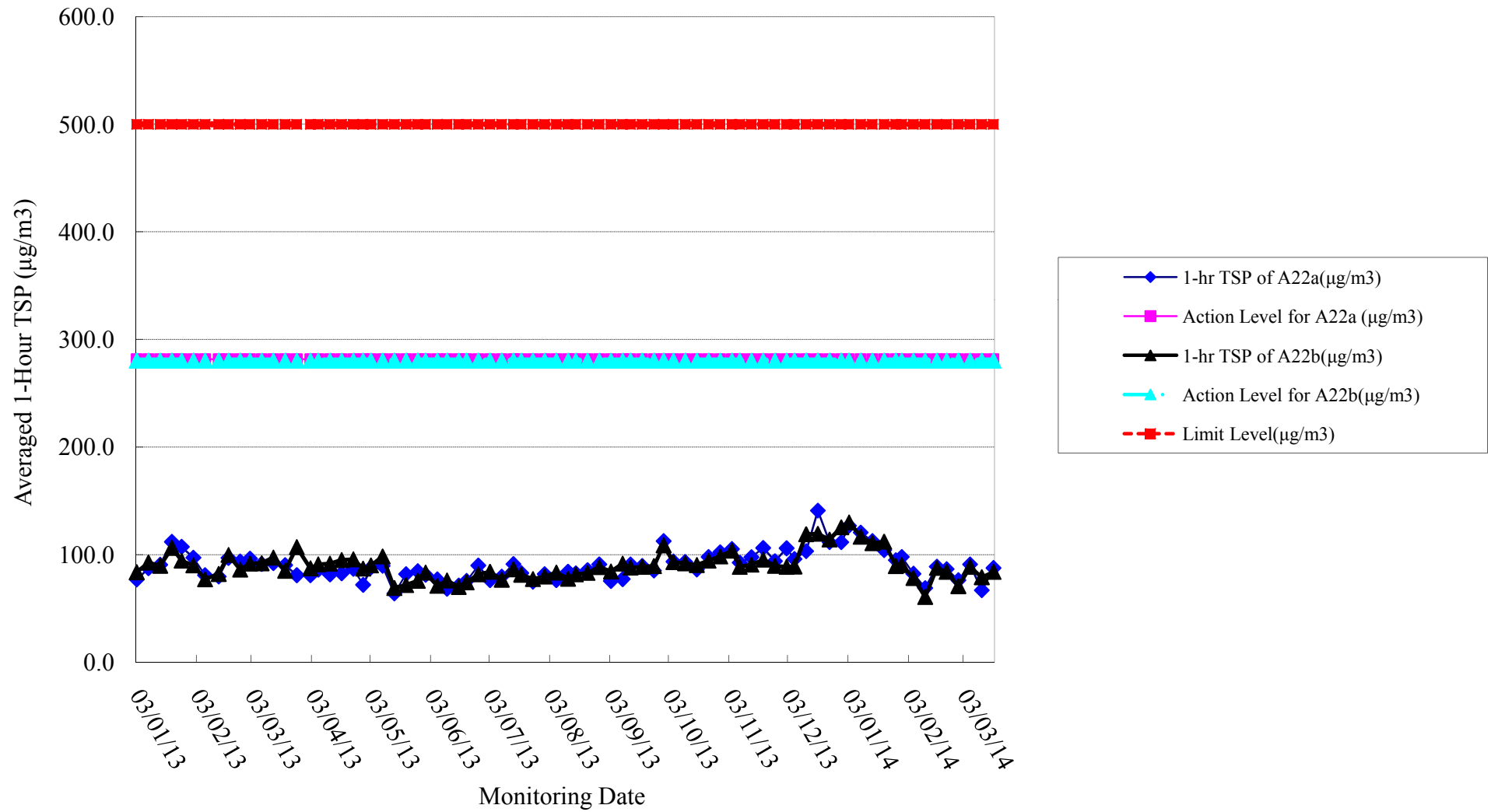
Impact Monitoring for reprovisioning of cremators in Wo Hop Shek Crematorium

Air Quality Monitoring: 24-hour TSP

Quarter: February 2014 - March 2014

Date	24-hr TSP of A22a ($\mu\text{g}/\text{m}^3$)	Action Level for A22a ($\mu\text{g}/\text{m}^3$)	24-hr TSP of A22b ($\mu\text{g}/\text{m}^3$)	Action Level for A22b ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
5/2/2014	69.0	157.3	62.0	157.0	260.0
11/2/2014	64.0	157.3	59.0	157.0	260.0
17/2/2014	69.0	157.3	65.0	157.0	260.0
22/2/2014	74.0	157.3	72.0	157.0	260.0
28/2/2014	77.0	157.3	72.0	157.0	260.0
6/3/2014	78.0	157.3	70.0	157.0	260.0
12/3/2014	63.0	157.3	66.0	157.0	260.0
18/3/2014	69.0	157.3	63.0	157.0	260.0

1-Hour TSP air quality monitoring data plot recorded at the designated monitoring points



Appendix C

Summary and Graphical Plot of 24-Hour TSP Monitoring Record

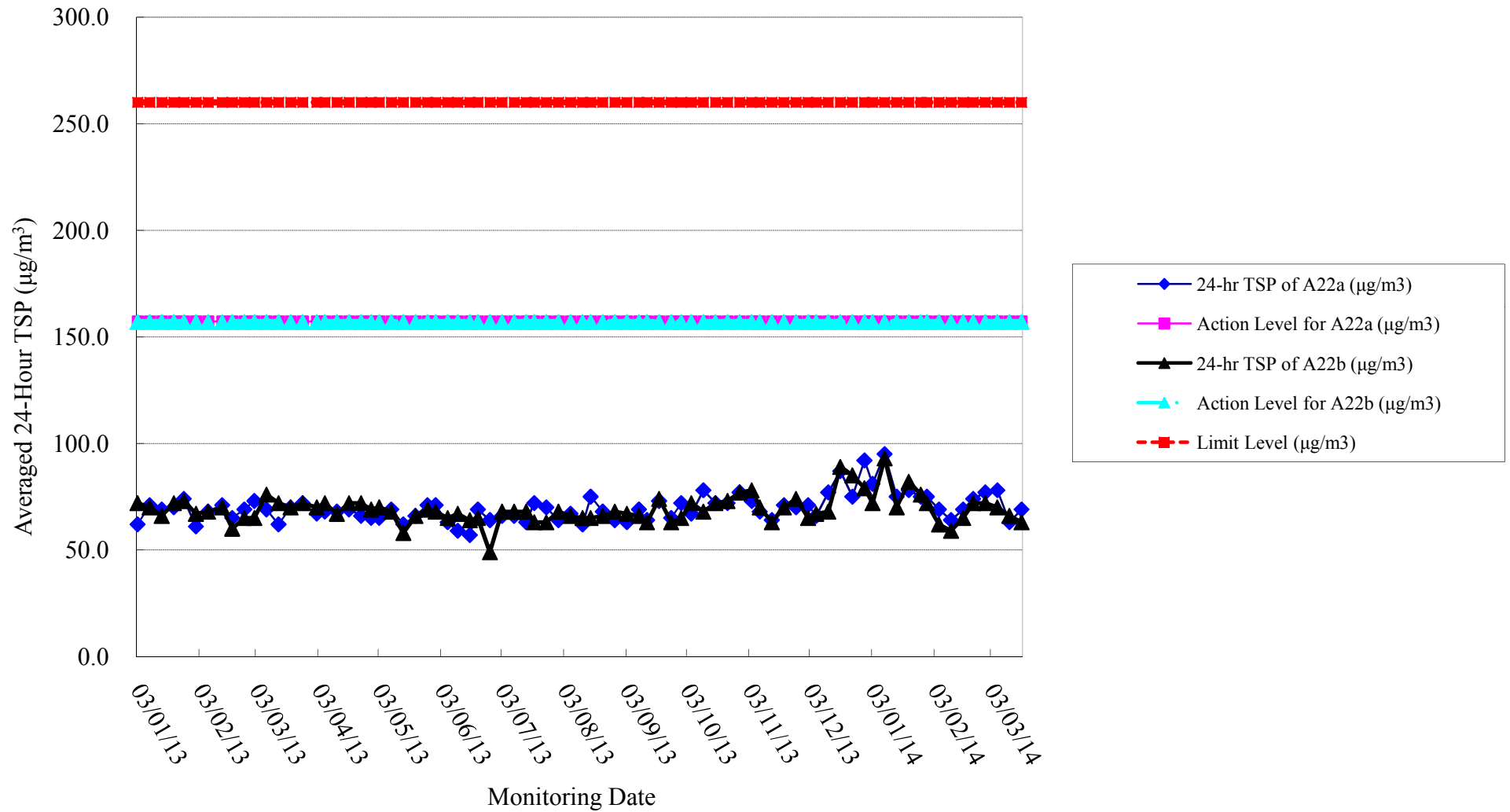
Impact Monitoring for reprovisioning of cremators in Wo Hop Shek Crematorium

Air Quality Monitoring: 24-hour TSP

Quarter: February 2014 - March 2014

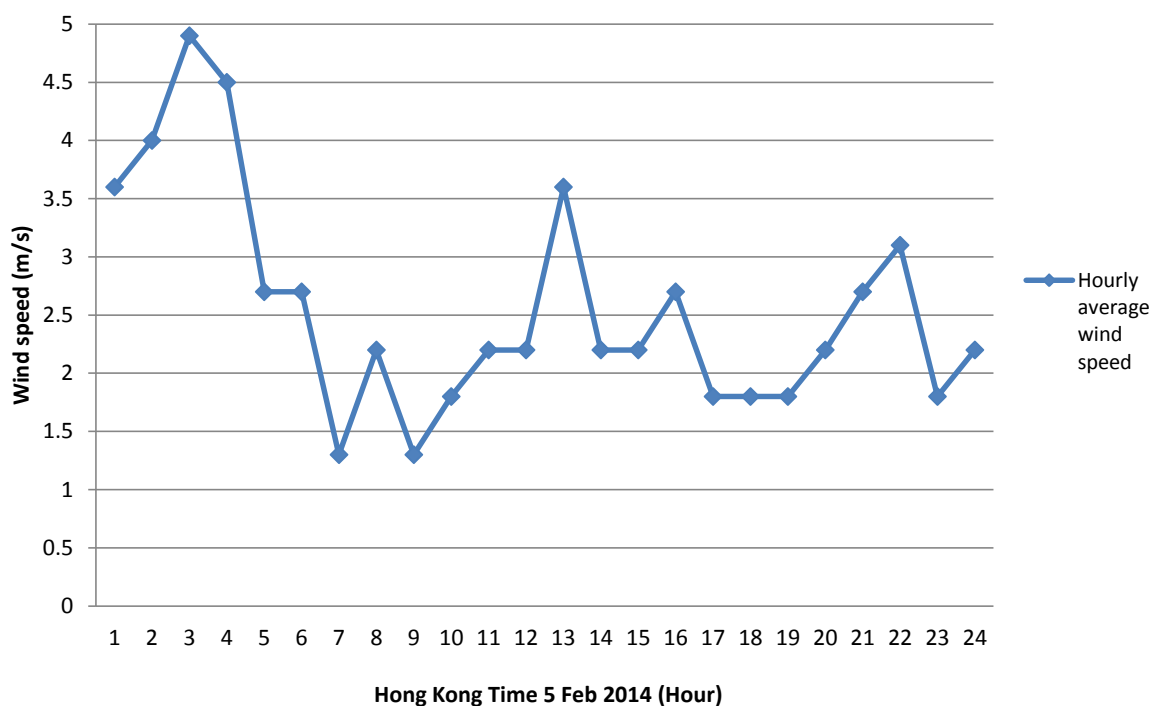
Date	24-hr TSP of A22a ($\mu\text{g}/\text{m}^3$)	Action Level for A22a ($\mu\text{g}/\text{m}^3$)	24-hr TSP of A22b ($\mu\text{g}/\text{m}^3$)	Action Level for A22b ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
5/2/2014	69.0	157.3	62.0	157.0	260.0
11/2/2014	64.0	157.3	59.0	157.0	260.0
17/2/2014	69.0	157.3	65.0	157.0	260.0
22/2/2014	74.0	157.3	72.0	157.0	260.0
28/2/2014	77.0	157.3	72.0	157.0	260.0
6/3/2014	78.0	157.3	70.0	157.0	260.0
12/3/2014	63.0	157.3	66.0	157.0	260.0
18/3/2014	69.0	157.3	63.0	157.0	260.0

24-Hour TSP air quality monitoring data plot recorded at the designated monitoring points

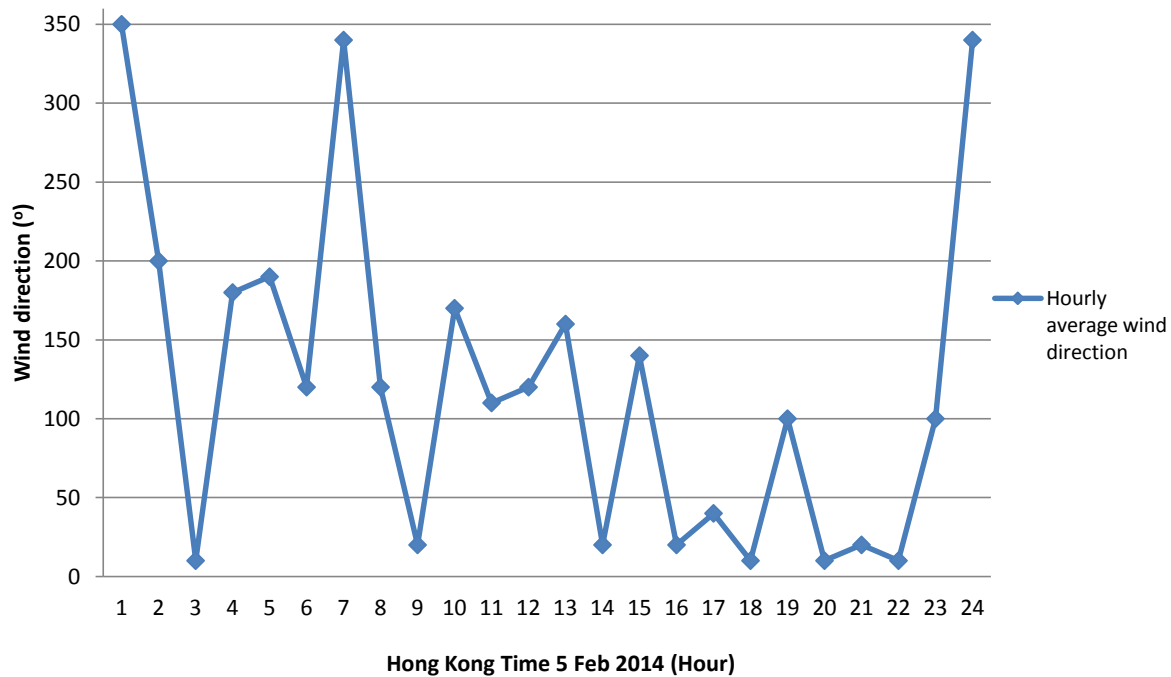


Appendix D
Wind Record

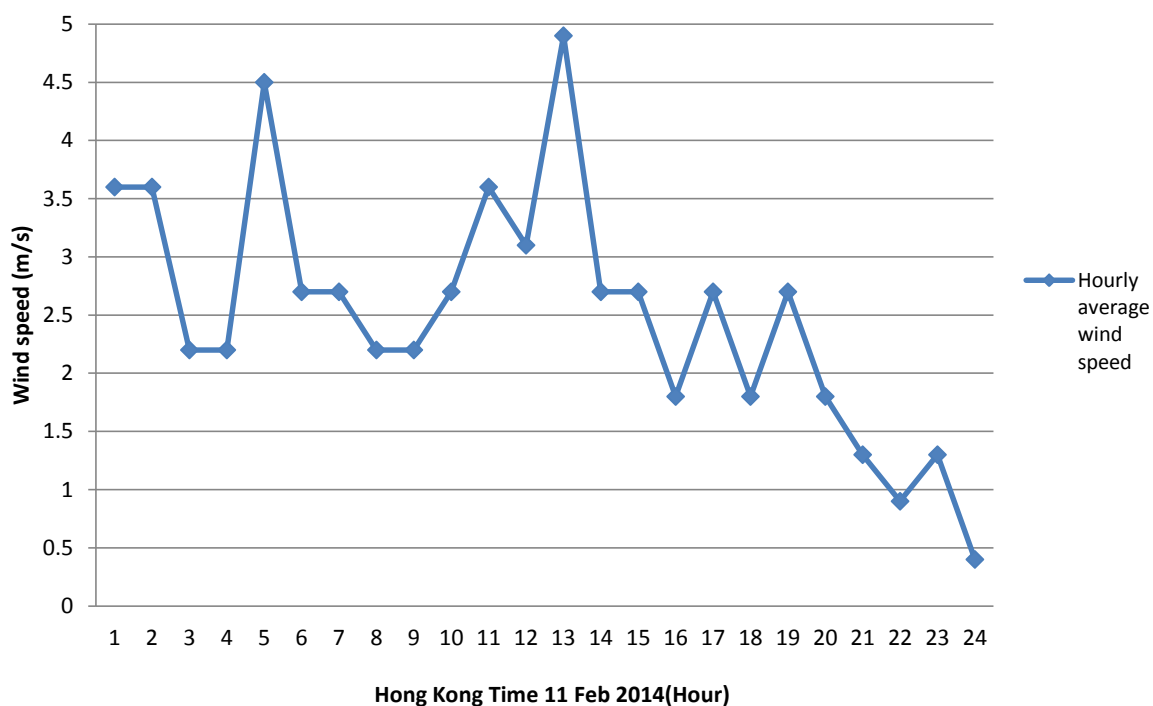
Wind speed profile at on-site wind station



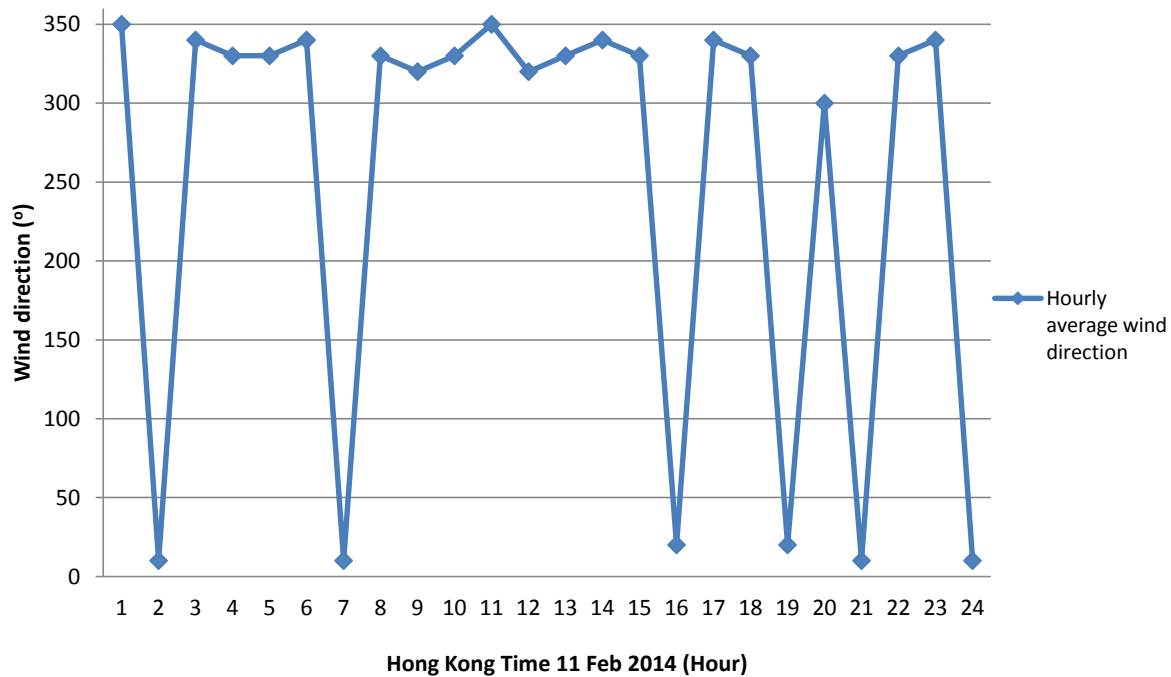
Wind direction profile at on-site wind station



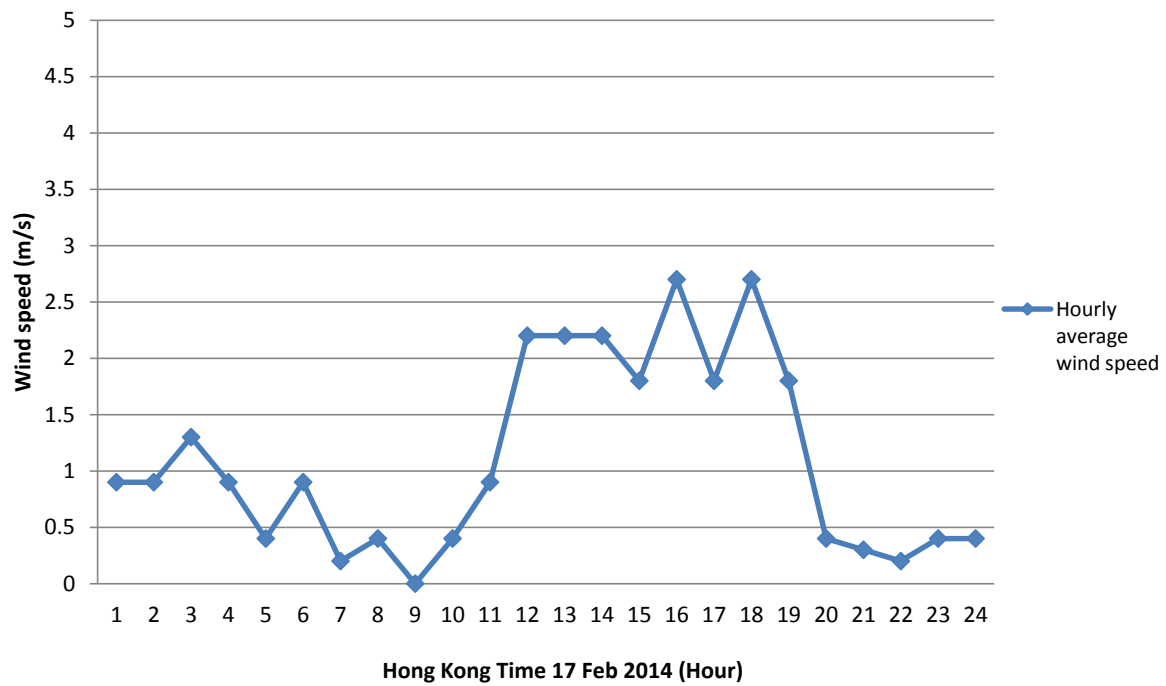
Wind speed profile at on-site wind station



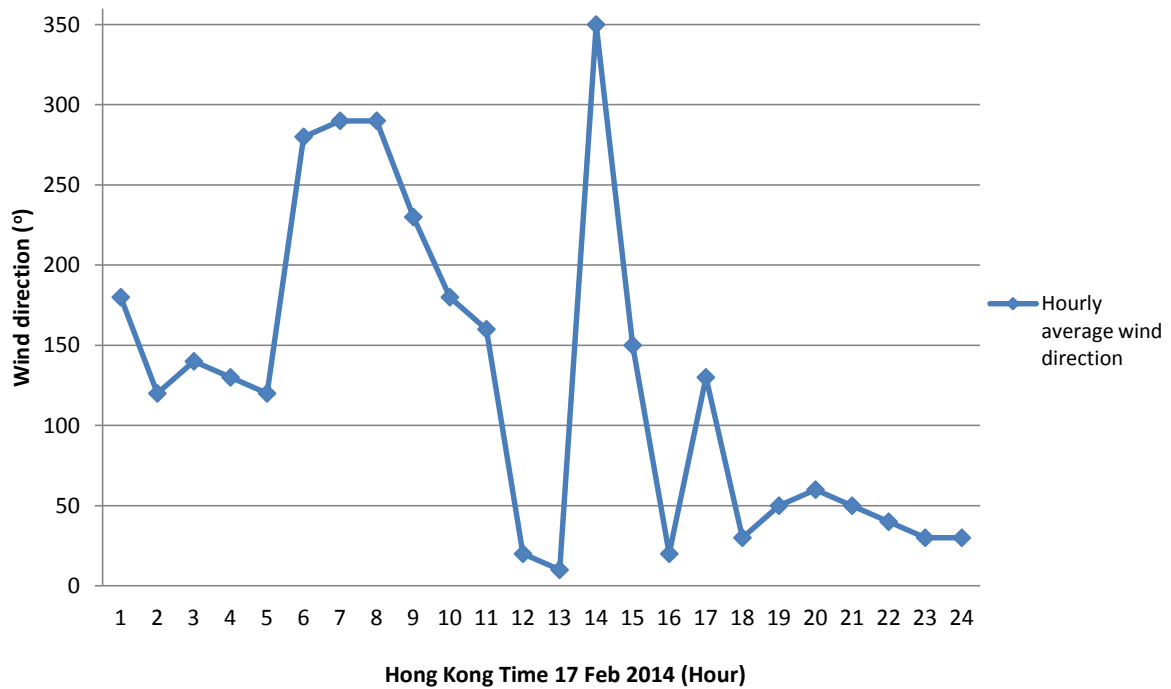
Wind direction profile at on-site wind station



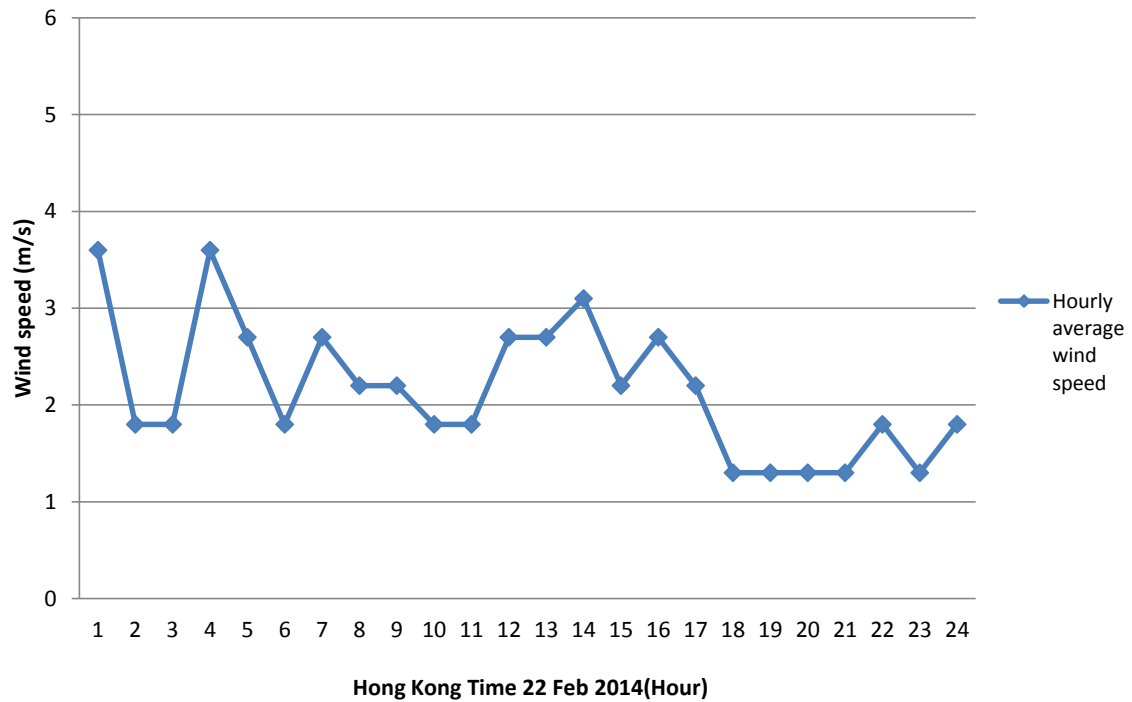
Wind speed profile at on-site wind station



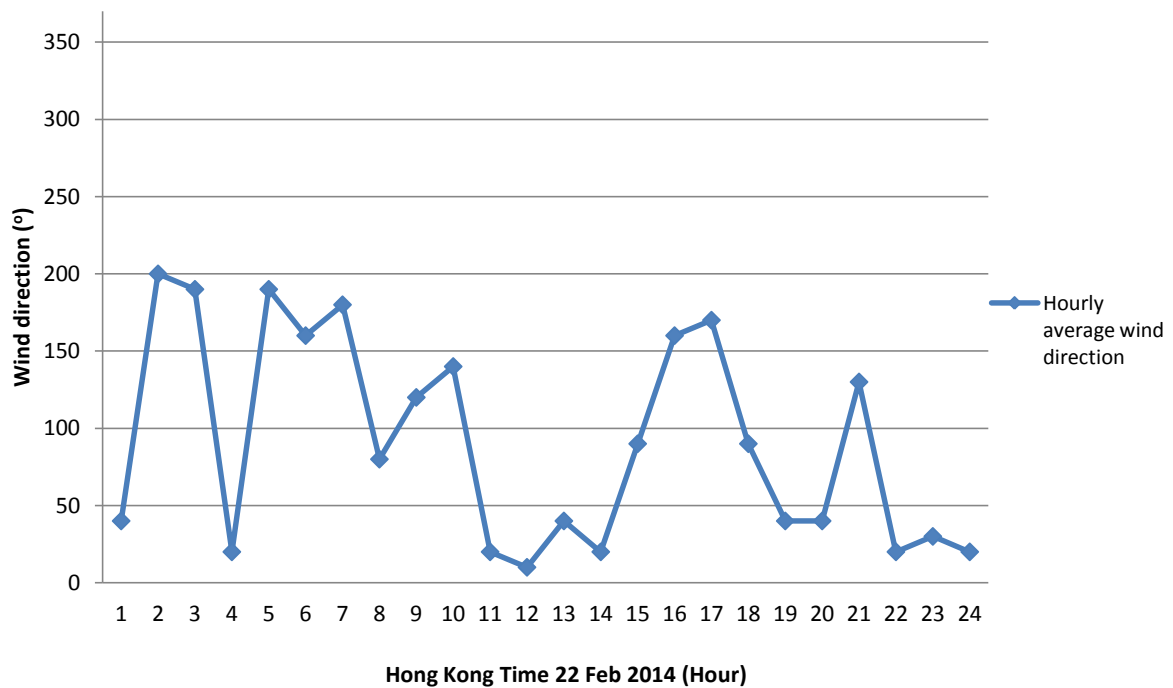
Wind direction profile at on-site wind station



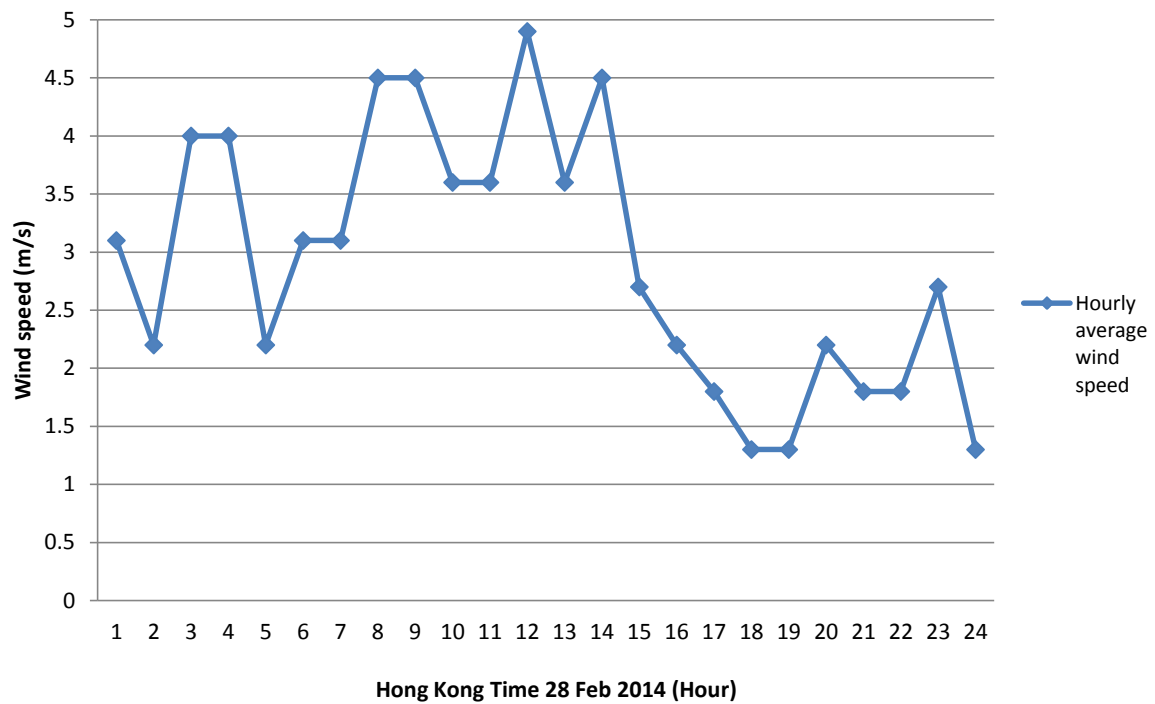
Wind speed profile at on-site wind station



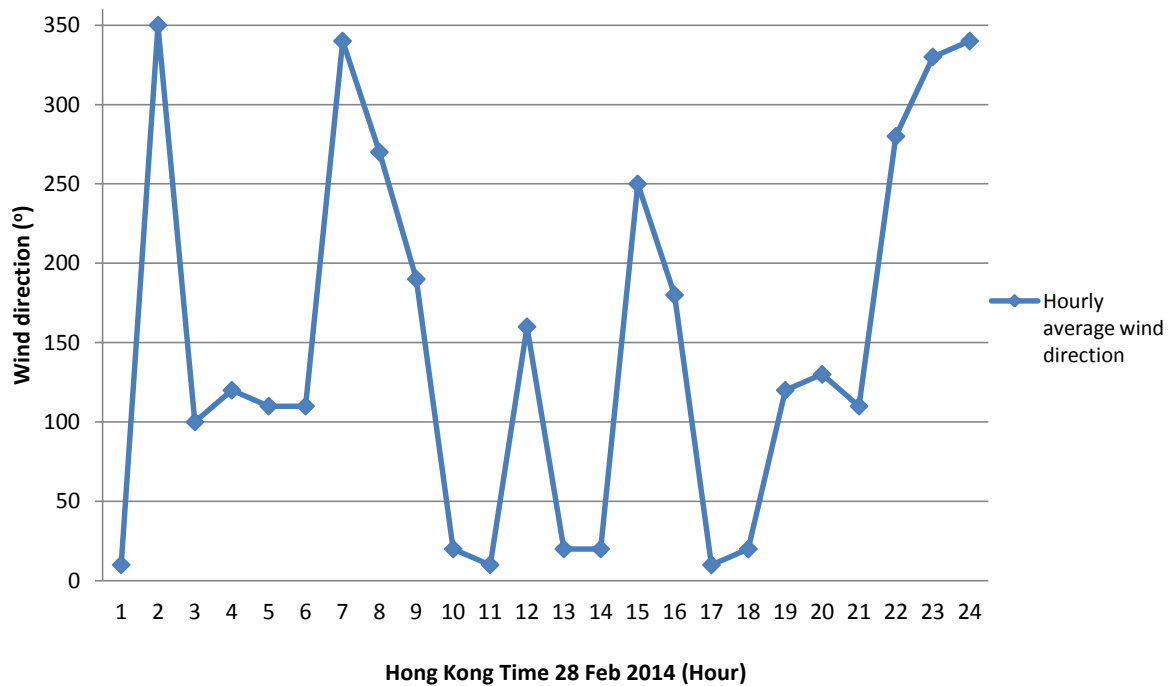
Wind direction profile at on-site wind station



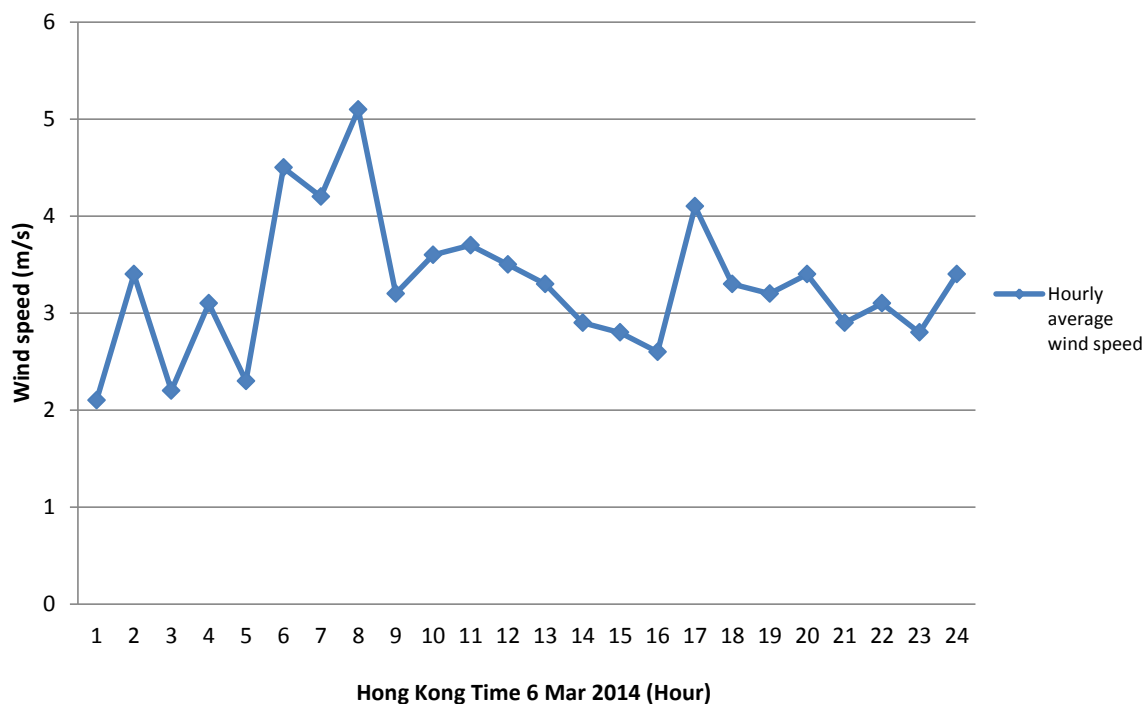
Wind speed profile at on-site wind station



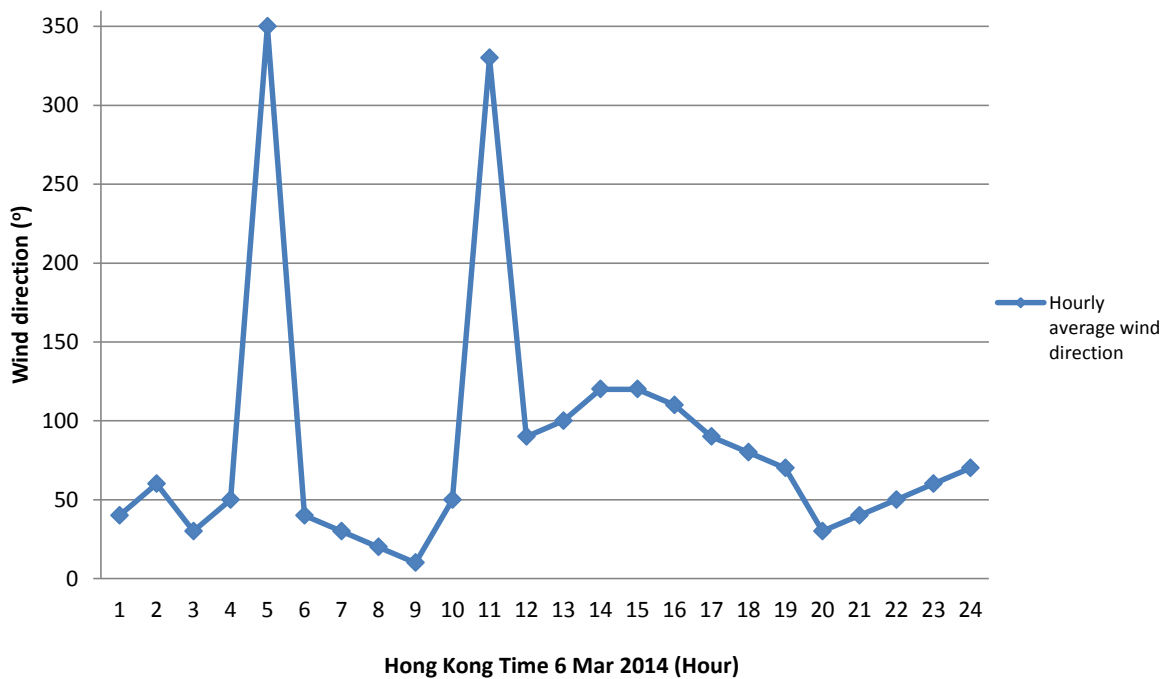
Wind direction profile at on-site wind station



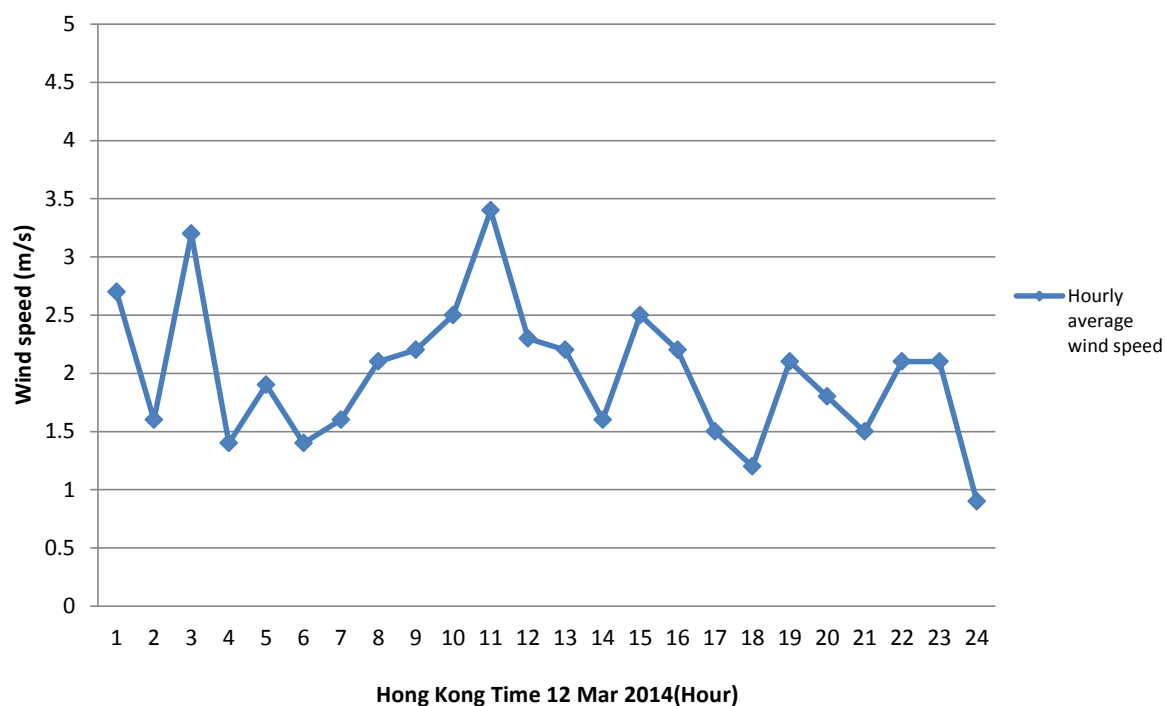
Wind speed profile at on-site wind station



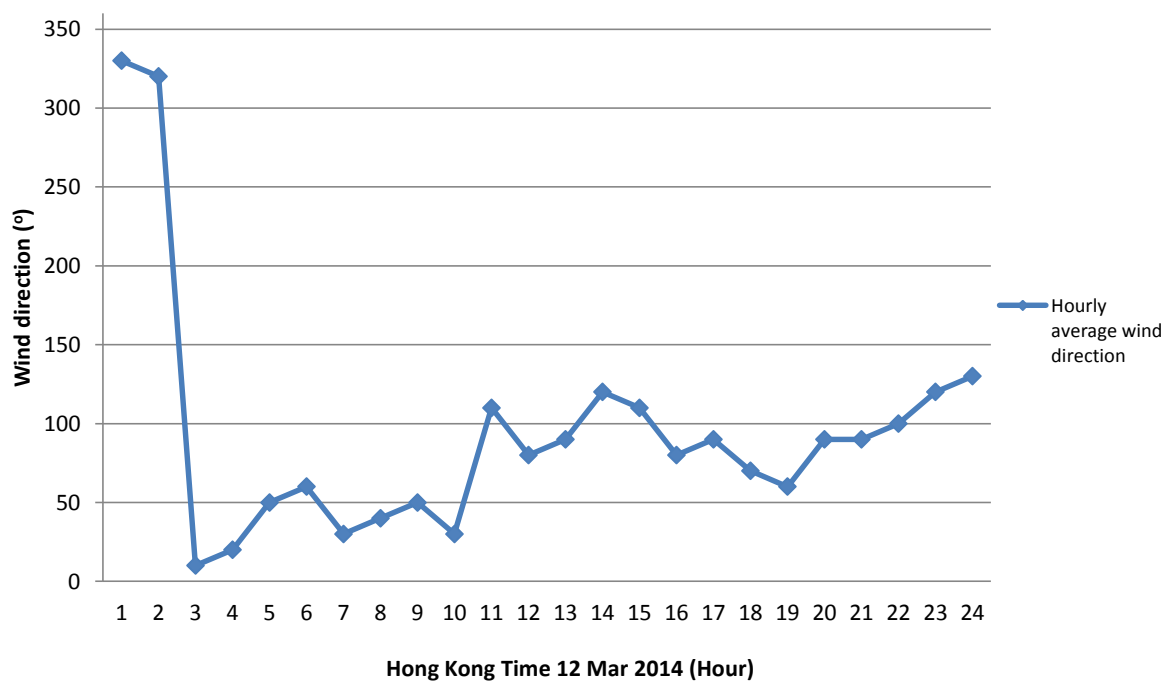
Wind direction profile at on-site wind station



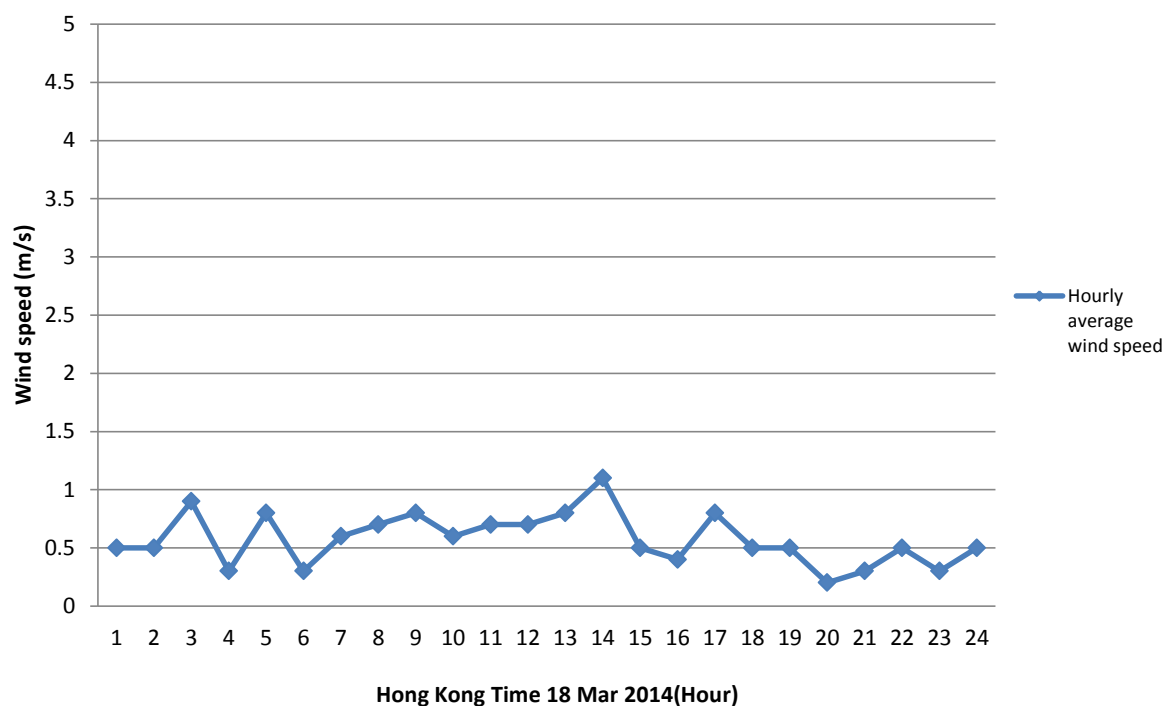
Wind speed profile at on-site wind station



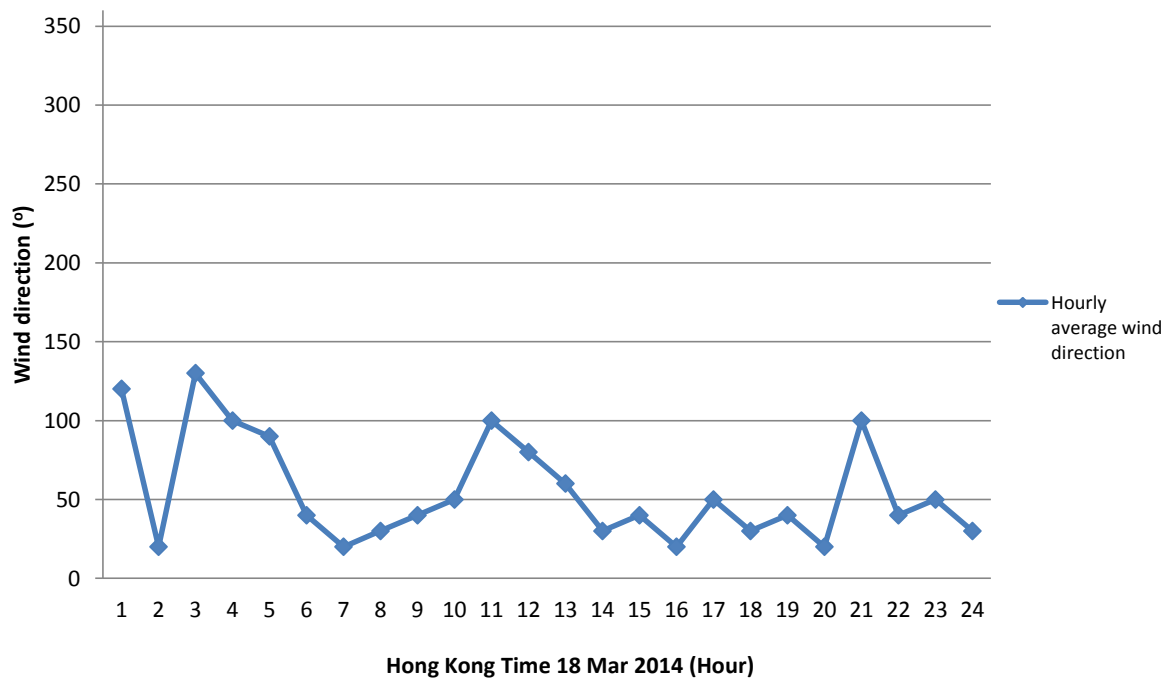
Wind direction profile at on-site wind station



Wind speed profile at on-site wind station



Wind direction profile at on-site wind station



Appendix E

Summary of Environmental Mitigation Implementation Status

Appendix E Environmental Mitigation Implementation Schedule

Impacts	Environmental Protection Measures / Mitigation Measures	Status
Air	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 license to operate. FEHD shall apply for a specified licence under the APCO.	N/A
	<i>Asbestos Investigation:</i>	
	▪ 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).	N/A
	▪ If any ACM are identified in the existing crematorium, an asbestos abatement plan shall be submitted to EPD prior to any asbestos abatement works.	N/A
	<i>The following precautionary and mitigation measures shall be implemented during the removal of ACM:</i>	
	▪ Enclosure of the work area.	N/A
	▪ Containment and sealing for the asbestos containing waste.	N/A
	▪ Provision of personal decontamination facility.	N/A
	▪ Use of personal respiratory/protection equipment.	N/A
	▪ Use of vacuum cleaner equipped with high-efficiency air particulate (HEPA) filter for cleaning up the work area.	N/A
	▪ Carrying out air quality monitoring during the asbestos abatement works.	N/A
	<i>The following qualified personnel shall be appointed to carry out the asbestos abatement works:</i>	
	▪ Registered asbestos contractor for carrying out the asbestos removal works.	N/A
	▪ Registered asbestos supervisor for supervising the asbestos abatement works.	N/A
	▪ Registered asbestos laboratory for monitoring the air quality during the asbestos abatement works.	N/A
	▪ Registered asbestos consultant for supervising and certifying the asbestos abatement works.	N/A
	<i>Other Site Management:</i>	
	The asbestos materials in each building/premises must be abated before other contractors/trades are allowed to work in the building/premises.	^
	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.	^
	<i>As different contractors may be working on-site at the same time, the following measures should be considered:</i>	
	▪ If there is a sensitive receptor around the area, conduct environmental air monitoring at this off-site receptor.	N/A
	▪ Submit to EPD a completion report, including photos and air monitoring results, immediately after completion of asbestos abatement work for every work zone.	^

Remarks: ^ Implement mitigation measure in the reporting month; X Non-compliance of mitigation measure;
 N/A Not Applicable in the reporting month; * Not satisfactory but rectified by the contractor.

Impacts	Environmental Protection Measures / Mitigation Measures	Status
	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.	^
	Good site management / practices to avoid / minimise incidences of dust emissions:	
	<i>Site Boundary and Entrance:</i>	
	▪ Vehicle washing facilities including a high pressure water jet shall be provided at every discernible or designated vehicle exit point.	N/A
	▪ 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.	N/A
	<i>Access Haul Roads and Unpaved Areas:</i>	
	▪ Each and every main haul road shall be paved with concrete, bituminous hardcore materials or metal plates, and kept clear of dusty materials. Or	^
	▪ Unpaved haul roads and areas shall be sprayed with water so as to keep the entire road surface wet.	N/A
	<i>Excavated Materials:</i>	
	▪ 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.	*
	<i>Exposed Earth:</i>	
	▪ 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.	^
	<i>Loading, Unloading or Transfer of Dusty Materials:</i>	
	▪ All dusty materials shall be sprayed with water immediately prior to any loading or transfer operation so as to keep the dusty material wet.	N/A
	<i>Debris Handling:</i>	
	▪ 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.	N/A
	<i>Transport of Dusty Materials:</i>	
	▪ 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.	^
	<i>Site Clearance:</i>	
	▪ 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.	^
	▪ Workers at all levels should be co-operative to avoid dust generation and dispersion to the surrounding environment.	^

Remarks: ^ Implement mitigation measure in the reporting month; X Non-compliance of mitigation measure;
 N/A Not Applicable in the reporting month; * Not satisfactory but rectified by the contractor.

Impacts	Environmental Protection Measures / Mitigation Measures	Status
	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.	N/A
	Proper operation and maintenance of the new crematorium and air pollution control unit of the cremators shall be ensured in order to avoid any un-controlled emissions due to malfunctioning of the cremator or air pollution control unit.	N/A
	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.	N/A
	<i>To minimise the possible nuisance due to joss paper burning, FEHD will limit joss paper burning activities through administration procedures as follows:</i>	
	Joss paper burners shall be allowed for use in memorial ceremonies upon request only.	N/A
	Other usage of joss paper burners shall not be allowed	N/A
	Guidance shall be provided to the users to advise them to minimise the quantity of burning materials.	N/A
	FEHD staff shall advise users to ensure better combustion of the joss papers in order to reduce smoke emission.	N/A
	Conduct baseline and regular 1-hr and 24-hr TSP monitoring at 2 measurement locations at a 6-day frequency	N/A
	Conduct continuous monitoring for the following pollutants and processes:	
	Temperature inside primary combustion zone.	N/A
	Temperature and oxygen content of the gas at appropriate location(s) to demonstrate requirements can be complied with.	N/A
	Carbon monoxide concentration at the outlet from the secondary combustion zone.	N/A
	Gas opacity at the chimney of the cremator.	N/A
	Other essential operating parameter(s) that may affect the performance of air pollution control measures.	N/A
	<i>Conduct periodic measurement for the following pollutants:</i>	
	Particulate Matters	^
	Hydrogen Chloride	N/A
	Carbon Monoxide	N/A
	Organic Compounds	N/A
	Mercury	N/A
	Dioxins	^
	Smoke Density	N/A
Noise	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.	N/A
	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.	N/A
	PME shall be well maintained and use properly on site to minimise the any excessive noise generated.	^

Remarks: ^ Implement mitigation measure in the reporting month; X Non-compliance of mitigation measure;
 N/A Not Applicable in the reporting month; * Not satisfactory but rectified by the contractor.

Impacts	Environmental Protection Measures / Mitigation Measures	Status
Land Contamination	- 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.	^
		N/A
	<i>Remedial Action Plan:</i>	
	If large amounts of contaminated soil (say 500m ³) 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.	N/A
	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.	N/A
	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.	N/A
	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).	N/A
	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.	N/A
	<i>Confirmatory Soil Sampling:</i>	
	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.	N/A
	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.	N/A
	If analytical results exceed the Dutch B (RBRGs) 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.	N/A
	<i>Further Site Investigation:</i>	
	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.	N/A
	The demolition contractor shall carry out further site investigations, after the decommissioning of the existing crematorium and skeletal cremator building.	N/A
	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.	N/A

Remarks: ^ Implement mitigation measure in the reporting month; X Non-compliance of mitigation measure;
 N/A Not Applicable in the reporting month; * Not satisfactory but rectified by the contractor.

Impacts	Environmental Protection Measures / Mitigation Measures		Status
	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.		^
	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.		N/A
	<i>Further Site Investigation:</i>		
	- Conduct further site investigation for Petroleum hydrocarbons and PAH in soil samples. - 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.		N/A
			N/A
			N/A
Waste Management	<i>Good Site Practice:</i>		
	- 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.		^
			^
	- 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. - 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. - 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).		^
			^
			^
			^
			^
			^
			^
			^
			^
			^
	<i>Waste Reduction Measures:</i>		
	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.		^

Remarks: ^ Implement mitigation measure in the reporting month; X Non-compliance of mitigation measure;
 N/A Not Applicable in the reporting month; * Not satisfactory but rectified by the contractor.

Impacts	Environmental Protection Measures / Mitigation Measures	Status									
	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.	^									
	- 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. - Plan and stock construction materials carefully to minimise the amount of waste generated.	^									
		^									
		^									
		^									
		^									
	<i>Excavated Material-</i> 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.	^									
	<i>Construction and Demolition Material:</i>										
	- 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.	^									
		^									
		^									
	- 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.	^									
		^									
<i>Contaminated Material – Further Contamination Investigation:</i>											
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><tr><th>Location</th><th>Investigation Parameter</th><th>Investigation Period</th><th>Responsible Party</th></tr><tr><td>Cremators / flue / chimney and surrounding areas</td><td>Asbestos (building structures)</td><td rowspan="2">After decommissioning but prior to demolition of the Existing Crematorium</td><td rowspan="2">The Contractor</td></tr><tr><td>Cremators / flue / chimney and surrounding areas</td><td>Dioxins, heavy metals, PAH (ash waste)</td></tr></table>	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)
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)									

Remarks: ^ Implement mitigation measure in the reporting month; X Non-compliance of mitigation measure;
 N/A Not Applicable in the reporting month; * Not satisfactory but rectified by the contractor.

Impacts	Environmental Protection Measures / Mitigation Measures	Status														
	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.	N/A														
	Asbestos Containing Material:															
	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.	^														
	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.	^														
	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><tr><th>Classification of Contamination</th><th>Dioxin Level in ash waste</th><th>Heavy Metal Level / Polyaromatic Hydrocarbon in Ash Waste</th></tr><tr><td>Low/Non Contaminated by DCM/HMCM/PAHCM</td><td><1 ppb TEQ</td><td>< RBRGs</td></tr><tr><td>Moderately/Severely Contaminated MCM/PAHCM</td><td><1 ppb TEQ</td><td>> RBRGs</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 ppb TEQ</td><td>Any Level</td></tr></table>	Classification of Contamination	Dioxin Level in ash waste	Heavy Metal Level / Polyaromatic Hydrocarbon in Ash Waste	Low/Non Contaminated by DCM/HMCM/PAHCM	<1 ppb TEQ	< RBRGs	Moderately/Severely Contaminated MCM/PAHCM	<1 ppb TEQ	> RBRGs	Moderately Contaminated DCM	> 1 and < 10 ppb TEQ	Any Level	Severely contaminated DCM	>10 ppb TEQ	Any Level
Classification of Contamination	Dioxin Level in ash waste	Heavy Metal Level / Polyaromatic Hydrocarbon in Ash Waste														
Low/Non Contaminated by DCM/HMCM/PAHCM	<1 ppb TEQ	< RBRGs														
Moderately/Severely Contaminated MCM/PAHCM	<1 ppb TEQ	> RBRGs														
Moderately Contaminated DCM	> 1 and < 10 ppb TEQ	Any Level														
Severely contaminated DCM	>10 ppb TEQ	Any Level														
Demolition, Handling, Treatment and Disposal of Low Contaminated DCM / HMCM / PAHCM from Demolition of Existing Crematorium																

Remarks: ^ Implement mitigation measure in the reporting month; X Non-compliance of mitigation measure;
 N/A Not Applicable in the reporting month; * Not satisfactory but rectified by the contractor.

Impacts	Environmental Protection Measures / Mitigation Measures	Status
	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.	N/A
Demolition, Handling, Treatment and Disposal of Moderately / Severely Contaminated DCM and Moderately / Severely Contaminated HMCM / PAHCM from Demolition of the Existing Crematorium		
<i>Site preparation procedures:</i>		
	Except the cremators/flue/chimney, all removable contaminated items shall be removed as far as practicable to avoid obstructing the decontamination activities.	N/A
	Preliminary site decontamination of all debris shall be carried out using High Efficiency Particulate Air (HEPA) vacuum cleaner.	N/A
	A chamber with three layers of polythene sheets shall enclose the top portion of the chimney above the roof.	N/A
	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.	N/A
	Workers shall carry out decontamination procedures before leaving the work area.	N/A
	All workers shall wear full protective equipment, disposable protective overall, nitrile gloves, rubber boots, and full-face positive pressure respirator.	N/A
	Warning signs in both Chinese and English shall be put up in conspicuous areas.	N/A
	<i>Site preparation procedures specific to severely contaminated DCM:</i>	
	The walls, floor and ceiling of the cremator room shall be lined with 3-layers of fire retardant polythene sheets.	N/A
	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.	N/A
	New pre-filters and HEPA filters shall be used on the air movers.	N/A
	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.	N/A
<i>Demolition and handling procedures:</i>		
	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.	N/A
	Wastes generated from the contaminant or decontamination unit including the workers protection clothing shall be disposed of at landfill site.	N/A
	After completion of removal, all surfaces shall be decontaminated by HEPA vacuum.	N/A
	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.	N/A
	<i>Demolition and handling procedures specific to severely contaminated DCM:</i>	

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	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.	N/A
	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.	N/A
	<i>Treatment and disposal procedures:</i>	
	Immobilise the ash waste by mixing with cement in the correct ratio as determined by pilot mixing and TCLP test.	N/A
	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.	N/A
	If the landfill disposal criteria cannot be met, disposal at the CWTC in Tsing Yi shall be considered.	N/A
	<i>Chemical Waste:</i>	
	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.	N/A
	<i>Containers used for the storage of chemical waste shall:</i>	
	Be suitable for the substance they are holding, resistant to corrosion, maintained in good condition, and securely closed.	N/A
	Have a capacity of less than 450 litres unless the specifications have been approved by the EPD.	N/A
	Display a label in English and Chinese in accordance with instructions prescribed in Schedule 2 of the Waste Disposal (Chemical Waste) (General) Regulation.	N/A
	<i>The storage area for chemical waste shall:</i>	
	Be clearly labelled and used solely for the storage of chemical waste.	N/A
	Be enclosed on at least 3 sides.	N/A
	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.	N/A
	Have adequate ventilation.	N/A
	Be covered to prevent rainfall entering (water collected within the bund must be tested and disposed as chemical waste if necessary).	N/A
	Be properly arranged so that incompatible materials are adequately separated.	N/A
	<i>Disposal of chemical waste shall be:</i>	
	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.	^

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	General Refuse:	
	▪ 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.	*
	▪ 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.	^
	Ash and non-combustible residues:	
	▪ 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.	^
	Chemical Wastes:	
	▪ 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.	^
	General Refuse:	
	▪ 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.	^
	▪ 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.	^
	Supplementary site investigations shall be conducted for asbestos in building structures and for dioxins, heavy metals and PAH in ash/particular matter samples.	^
Landscape and Visual	Site offices and construction yards:	
	▪ 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.	^
	Height of site offices:	
	▪ 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.	N/A

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	<i>Hoarding and screening:</i>	
	▪ 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.	N/A
	<i>Construction plant and building material:</i>	
	▪ 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.	^
	▪ All construction plants shall be removed from site upon completion of construction works.	^
	<i>Construction light:</i>	
	▪ To be oriented away from the viewing location of VSRs.	^
	▪ All lighting facing sensitive receiver shall have frosted diffusers and reflective covers.	^
	<i>Silting trap:</i>	
	▪ Silting traps shall be installed to minimise silting to streams.	^
	<i>Compensation for losses:</i>	
	▪ The tree compensation to tree loss ratio shall be at least 1:1 in term of quantity.	N/A
	▪ Where practical, trees that require removal shall be transplanted on Site.	N/A
	<i>Amenity planting:</i>	
	▪ 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.	N/A
	▪ New trees, shrubs and groundcover shall be carefully selected and designed to homogenize with the environment.	N/A
	<i>Woodland mix planting:</i>	
	▪ 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.	^
	<i>Preservation:</i>	
	▪ 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.	^
	▪ Existing shrub and ground cover planting areas that will not be removed shall be maintained in good condition and enhanced where practical.	^
	The 10m height headroom cremation plant room shall be half sunken to reduce the visual impact to pedestrians.	^

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	The chimney shall be designed to have sculptural outlook and articulated.	^
	The chimney stacks shall be designed to locate at the least conspicuous location of the site to VSRs.	^
	Details of the inspection frequency and parameters will be outlined in the EM&A Manual.	^
Water Quality	<i>Construction Runoff and Drainage:</i>	
	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.	N/A
	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 minimize 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.	N/A
	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.	N/A
	Open stockpiles of construction materials on Site shall be covered with tarpaulin or similar fabric during rainstorms.	N/A
	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.	N/A
	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.	N/A
	<i>General Construction Activities:</i>	
	Debris and rubbish generated on Site shall be collected, handled and disposed of properly to avoid them entering the two streams.	N/A
	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.	N/A
	Open storm water drains and culverts near the works area shall be covered to block the entrance of large debris and refuse.	N/A
	<i>Sewage from On-site Workforce:</i>	
	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.	N/A
	<i>Groundwater:</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.	N/A

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Ecology	<i>Mitigation to minimise impacts on habitat and vegetation loss:</i>	
	▪ 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.	N/A
	▪ Compensatory planting of the felled trees shall follow the Technical Circular No. 3/2006 issued by ETWB.	N/A
	<i>Mitigation to construction runoff through general good site practice:</i>	
	▪ Temporary access to the work sites shall be carefully planned and located to minimise disturbance caused to the streams and nearby habitats.	N/A
	▪ 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.	^
	▪ 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.	N/A
	▪ Natural bottom and existing flow in the streams shall be preserved as much as possible to avoid disturbance to the stream habitats.	N/A
	▪ 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.	N/A
	▪ Stockpiling of construction materials, if necessary, shall be properly covered and located away from the streams and nearby habitats.	N/A
	▪ 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.	N/A
	▪ Construction effluent, site runoff and sewage shall be properly collected and/or treated.	N/A
	▪ Proper locations for discharge outlets of wastewater treatment facilities well away from the streams and nearby habitats shall be identified.	N/A
	▪ Vehicles and other plant shall be carefully maintained and properly used to minimise the chance for accidental spillage.	N/A
	▪ Any spillages that do occur shall be quickly identified and appropriately cleaned up before they can contaminate streams or groundwater.	N/A
	▪ 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.	N/A
	▪ Silt traps shall be installed at points where drainage from the Site enters temporary sewage system.	N/A
	▪ 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.	N/A

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	<i>Mitigation to protect the groundwater:</i>	
	▪ 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.	N/A
	▪ No groundwater shall be pumped back to the two stream courses to protect the natural integrity of the stream habitat and the associated organism.	N/A
	<i>Mitigation for noise and other disturbance on ecological integrity:</i>	
	▪ Use of sturdy 1.8 metres protective fencing shall be located at the edge of the tree canopy but not around the trunk.	N/A
	▪ 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.	N/A
	▪ 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.	^
	▪ 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.	^
	<i>Audit/Inspection:</i>	
	▪ 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).	^
	<i>Monitoring on Transplantation:</i>	
	▪ 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.	N/A

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