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Kai Tak Development Engineering Study
cum Design and Construction of Advance Works
– Investigation, Design and Construction

DECOMMISSIONING OF THE FORMER KAI TAK AIRPORT OTHER THAN THE NORTH APRON ENVIRONMENTAL MONITORING AND AUDIT MANUAL

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5 AIR QUALITY IMPACT

5.1 Introduction

5.1.1 In this section, the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of air quality impact associated with the decommissioning activities of the Project are presented. As identified in the EIA report, the Project would not cause any adverse air quality impacts. However, environmental monitoring and audit is recommended to monitor the effectiveness of the proposed measures.

5.1.2 The objectives of the air quality monitoring are:

- To identify the extent of construction dust impact on sensitive receivers;
- To determine the effectiveness of mitigation measures in controlling fugitive dust emission and volatile organic compounds (VOCs) emission from biopiling system;
- To audit the compliance of the Contractor with regard to dust control, contract conditions and the relevant dust impact criteria;
- To recommend further mitigation measures if found to be necessary; and
- To comply with Action and Limit Levels for air quality as defined in this Manual.

5.2 Methodology and Criteria

Ambient Dust Monitoring at Sensitive Receivers

5.2.1 The ambient air quality criteria to be monitored and assessed are:

- The Hong Kong Air Quality Objectives (AQOs) for total suspended particulates (TSP) namely 24-hour average TSP levels of 260μgm^{-3}; and
- 1-hour average TSP guideline limit of 500μgm^{-3}.

5.2.2 These levels are not to be exceeded at Air Sensitive Receivers (ASRs).

5.2.3 Monitoring and audit of the TSP levels shall be carried out by the ET to detect any deteriorating air quality and to take timely action to rectify such situation.

5.2.4 1-hour and 24-hour average TSP levels shall be measured to indicate the impacts of construction dust on air quality. The 24-hour average TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the United States Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon agreement from the Engineer's Representative (ER) and the IEC, 1-hour average TSP levels can be measured by direct reading methods to indicate short-term impacts.

5.2.5 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, other local atmospheric factors affecting or affected by site conditions and work progress of the concerned site etc. shall be recorded in detail. A sample data record sheet based on the one presented in the EM&A Guidelines for Development Projects in Hong Kong, is shown in **Appendix B**. The ET Leader may modify the data record sheet for this EM&A programme, of which the format should be agreed by the ER and the IEC.

Biopiling System Discharge Emissions Monitoring

5.2.6 The emission limit at the discharge vent(s) of the biopiling system adopted for the purpose of this Manual is 20 mg/m^3 (at 0°C, 101.325 kPa, 11% O_2 and dry condition) for the

concentration limit of VOC.

5.2.7 VOC emissions from biopile vent(s) shall be monitored. Continuous emission monitoring (CEM) system to be proposed by the Contractor shall be able to measure VOC emission and other plant performance parameters, such as oxygen, carbon dioxide and carbon monoxide continuously. The measurement results shall be recorded properly such that timely remedial action can be implemented in case of exceedance of emission standard.

5.2.8 The biopile exhausted air quality (measured as VOC) shall also be monitored at the site boundary based on the 1-hour average TPH, Ethylbenzene and Xylenes of 1300 $\mu g/m^3$.1000 $\mu g/m^3$ and 22,000 $\mu g/m^3$, respectively. .

5.3 Monitoring Equipment

Ambient Dust Monitoring at Sensitive Receivers

High Volume Sampler

5.3.1 For measuring TSP, a 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 m^3 per minute (20 - 60 standard cubic feet per minute) 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 cm^2 ;
- Flow control accuracy: ± 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;
- Capable of operating continuously for 24-hour period.

5.3.2 The ET shall be responsible for the provision of the monitoring equipment. The ET shall provide sufficient number of HVSs with appropriate calibration kit for carrying out the baseline, regular impacts 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.

5.3.3 Initial calibration of the dust monitoring equipment shall be conducted upon installation and prior to commissioning, and at bi-monthly intervals subsequently. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data shall be properly documented for future reference by the concerned parties such as the IEC. All the data shall be converted into standard temperature and pressure condition.

5.3.4 The flow-rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded on the data sheet as shown in **Appendix B**.

Potable Dust Meter

5.3.5 If the ET proposes to use a direct reading dust meter to measure 1-hour average TSP levels, he/she shall submit sufficient information to the ER and the IEC to prove that the instrument is capable of achieving a comparable result as that of the HVS before it may be used for the monitoring works. The instrument shall also be calibrated regularly, and the 1-hour sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.

Wind Velocity Logger

5.3.6 Wind data monitoring equipment shall also be provided by the ET 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 and agreed with the ER in consultation with the IEC. For installation and operation of wind data monitoring equipment, the following points shall be observed:

(i) The wind sensors shall be installed 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;

(ii) The wind data shall be captured by a data logger. The data shall be downloaded for analysis at least once a month;

(iii) The wind data monitoring equipment shall be re-calibrated at least once every six months; and

(iv) Wind direction should be divided into 16 sectors of 22.5 degrees each.

5.3.7 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IEC.

Biopiling System Discharge Emissions Monitoring

5.3.8 Monitoring of VOC emission from the discharge vent(s) of the biopile shall be accomplished by a CEM system. The specification and detection range of the CEM system shall be proposed by the Contractor / ET for the IEC approval before the CEM system commences.

5.3.9 Monthly monitoring of VOC at the site boundary shall be accomplished by a Photo Ionisation Detector (PID). The PID used on site should equipped with lamp having energy of at least 9.8eV with a measurement range of at least 0.0 to 99.9 ppm or any equivalent model agreed by the IEC.

Laboratory Measurement / Analysis

5.3.10 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 available for sample analysis, and equipment calibration and maintenance. The laboratory shall be HOKLAS accredited or other internationally accredited laboratory.

5.3.11 If a site laboratory is set up or a non-HOKLAS accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment shall be approved by the IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the IEC.

5.3.12 The IEC shall conduct regular audit of the measurement performed by the laboratory so as to ensure the accuracy of measurement results. The ET shall provide the ER and the IEC

with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for their reference.

5.3.13 Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pinholes, and shall be conditioned in a humidity-controlled chamber for over 24-hour and be pre-weighed before use for the sampling.

5.3.14 After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed bag. The filter paper shall then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1mg. The balance shall be regularly calibrated against a traceable standard.

5.3.15 All the collected samples shall be kept in a good condition for 6 months before disposal.

5.4 Monitoring Locations

Ambient Dust Monitoring at Sensitive Receivers

5.4.1 The proposed dust monitoring locations are shown in **Drawing 5.1**. The selected monitoring locations are the ASRs located near to the Project site. The proposed air quality monitoring locations are listed in **Table 5.1** below.

Table 5.1 Proposed Air Quality Monitoring Locations

Location	ASR ID in EIA	Description
AM1	A8	Hong Kong International Trade and Exhibition Centre
AM2	A10	Sing Tao Building
AM3	A17	Public Works Central Laboratory Building

5.4.2 The status and locations of the ASRs may change after issuing this Manual. The ET shall propose updated monitoring locations and seek approval from EPD, and agreement from the ER and the IEC before baseline monitoring commences.

5.4.3 When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:

(i) At the site boundary or such locations close to the major dust emission source;

(ii) Close to the ASRs;

(iii) Proper position/sitting and orientation of the monitoring equipment; and

(iv) Take into account the prevailing meteorological conditions.

5.4.4 The ET shall agree with the ER on the position of the HVS for installation of the monitoring equipment. When positioning the samplers, the following points shall be noted:

(i) A horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;

(ii) No two samplers shall be placed less than 2 metres apart;

(iii) The distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;

(iv) A minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;

(v) A minimum of 2 metres of separation from any supporting structure, measured horizontally is required;

(vi) No furnace or incinerator flue is nearby;

(vii) Airflow around the sampler is unrestricted;

(viii) The sampler is more than 20 metres from the dripline;

(ix) Any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;

(x) Permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and

(xi) A secured supply of electricity is needed to operate the samplers.

Biopiling System Discharge Emissions Monitoring

5.4.5 Emissions of biopile vent(s) shall be measured during remediation phase upon commissioning of the biopiling system within the Project site. Monitoring point shall be at the discharge vent location after the treatment process and shall be agreed with the IEC and the ER

5.4.6 VOC level at the site boundary shall be measured during decommissioning and decontamination process. The locations shall be agreed with the IEC and the ER.

5.5 Baseline Monitoring

Ambient Dust Monitoring at Sensitive Receivers

5.5.1 Baseline monitoring shall be carried out to determine the ambient 1-hour and 24-hour average TSP levels at the monitoring locations prior to the commencement of the Project works. During the baseline monitoring, there shall not be any construction or dust generating activities in the vicinity of the monitoring stations. The baseline monitoring will provide data for the determination of the appropriate Action Levels with the Limit Levels set against statutory or otherwise agreed limits.

5.5.2 Before commencing the baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.

5.5.3 Baseline monitoring shall be carried out at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works to obtain daily 24-hour TSP samples. One-hour sampling shall also be done at least 3 times per day. Baseline monitoring shall be carried out under typical weather conditions. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources shall also be recorded throughout the baseline monitoring period.

5.5.4 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring location shall be approved by the

ER and agreed with the IEC.

5.5.5 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with the ER, the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to the ER and the IEC for agreement and EPD for approval.

5.5.6 Baseline checking of ambient TSP levels shall be carried out every three months at each monitoring location, when no dusty works activities are in operation. If the ET considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels. The revised baseline levels, and hence the revised Action and Limit Levels, shall be agreed with the ER, EPD and the IEC.

Biopiling System Discharge Emissions Monitoring

5.5.7 Before commencement, the biopiling system shall be subject to a satisfactory commissioning test on the system performance and emission compliance. Upon the commissioning test result, compliance standards of system performance parameters, such as VOC shall be determined and shall be checked against during impact monitoring.

5.6 Impact Monitoring

Ambient Dust Monitoring at Sensitive Receivers

5.6.1 The ET shall carry out impact monitoring during the decommissioning phase of the Project. For regular impact monitoring, a sampling frequency of at least once in every six days shall be strictly observed at all of the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six days shall be undertaken when the highest dust impact occurs.

5.6.2 Before commencing the impact monitoring, the ET shall inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the impact monitoring results.

5.6.3 The specific time to start and stop the 24-hour TSP monitoring shall be clearly defined for each location and be strictly followed by the field operator.

5.6.4 In case of non-compliance with the Action and Limit Levels, more frequent monitoring, as specified in the Event and Action Plan in **Table 5.3**, shall be conducted within 24 hours after the non-compliance is known. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

Biopiling System Discharge Emissions Monitoring

5.6.5 VOC emissions from the discharge vent(s) of the biopiling system are to be measured by a CEM system. Monitoring requirements are summarized in **Table 5.2**.

Table 5.2 Biopiling System Discharge Emission Monitoring Requirements

Emission Point	Parameter	Sampling hours	Sampling Details	Frequency
Biopile Discharge Vent	VOC	Continuous	CEM system	Continuous

5.6.6 Ambient VOC monitoring shall be measured by a PID and shall be conducted in monthly interval.

5.7 Event and Action Plan

5.7.1 The baseline monitoring results form the basis for determining the Action and Limit Levels for the impact monitoring. The ET shall compare the impact monitoring results with the Action and Limit Levels for 1-hour and 24-hour average TSP and the continuous VOC measurements. **Table 5.3, 5.4** and **5.5** shows the Action and Limit Levels to be used. Should non-compliance of the Action and Limit Levels occurs, action in accordance with the Event and Action Plan in **Table 5.6** and **5.7** shall be carried out.

Table 5.3 Action and Limit Levels for Ambient Dust Monitoring

Parameter	Action Level (1)	Limit Level
24-hour average TSP	BL ≤ 200 μg m^{-3}, AL = (BL * 1.3 + LL)/2 BL > 200 μg m^{-3}, AL = LL	260 μg m^{-3}
1-hour average TSP	BL ≤ 384 μg m^{-3}, AL = (BL * 1.3 + LL)/2 BL > 384 μg m^{-3}, AL = LL	500 μg m^{-3}

Note: (1) BL = Baseline level, AL = Action Level, LL = Limit Level.

Table 5.4 Limit Levels for Plant Emissions Monitoring

Emission Point	Parameter	Limit Level
Biopile Discharge Vent	VOC	20 ppm

Table 5.5 Limit Levels for Ambient VOC Monitoring at Site Boundary

Parameter	Limit Level
TPH	1300 μg m^{-3}
Ethylbenzene	1300 μg m^{-3}
Xylenes	22000 μg m^{-3}

Table 5.6 Event and Action Plan for Air Dust Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action Level being exceeded by one sampling	1. Identify source and investigate the causes of exceedance; 2. Inform Contactor, IEC and ER; 3. Repeat measurement to confirm finding.	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.
Action Level being exceeded by two or more consecutive sampling	1. Identify source and investigate the causes of exceedance; 2. Inform Contractor, IEC and ER; 3. Increase monitoring frequency to daily; 4. Discuss with IEC and Contractor on remedial actions required; 5. Assess the effectiveness of Contractor's remedial actions; 6. If exceedance continues, arrange meeting with IEC and ER; 7. If exceedance stops, cease additional monitoring.	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 ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise implementation of remedial measures; 5. Conduct meeting with ET and IEC if exceedance continues.	1. Discuss with ET and IEC on proper remedial actions; 2. Submit proposals for remedial actions to ER and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
Limit Level being exceeded by one sampling	1. Identify source and investigate the causes of exceedance; 2. Inform Contractor, IEC, ER, and EPD; 3. Repeat measurement to confirm finding; 4. Assess effectiveness of Contractor's remedial actions and keep EPD, IEC and ER 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 ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise implementation of remedial measures; 5. Conduct meeting with ET and IEC if exceedance continues.	1. Take immediate action to avoid further exceedance; 2. Discuss with ET and IEC on proper remedial actions; 3. Submit proposals for remedial actions to ER and IEC within three working days of notification; 4. Implement the agreed proposals.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Limit Level being exceeded by two or more consecutive sampling	1. Notify IEC, ER, Contractor and EPD; 2. Repeat measurement to confirm findings; 3. Carry out analysis of Contractor's working procedures to identify source and investigate the causes of exceedance; 4. Increase monitoring frequency to daily; 5. Arrange meeting with IEC, ER and Contractor to discuss the remedial actions to be taken; 6. Assess effectiveness of Contractor's remedial actions and keep EPD, IEC and ER informed of the results; 7. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 4. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise implementation of remedial measures; 5. If exceedance continues, consider stopping the Contractor to continue working on that portion of work which causes the exceedance until the exceedance is abated.	1. Take immediate action to avoid further exceedance; 2. Discuss with ET, ER and IEC on proper remedial actions; 3. Submit proposals for remedial actions to IEC within three working days of notification; 4. Implement the agreed proposals; 5. Submit further remedial actions if problem still not under control; 6. Stop the relevant portion of works as instructed by the ER until the exceedance is abated.

Table 5.7 Event and Action Plan for Biopiling System Discharge Emissions Monitoring and Ambient VOC Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Exceedance for one sample	1. Identify source and investigate the causes of exceedance and propose remedial measures; 2. Inform Contactor, IEC and ER; 3. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER 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.	1. Confirm receipt of notification of exceedance in writing; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Amend proposal if appropriate.
Exceedance for two or more consecutive samples	1. Identify source and investigate the causes of exceedance; 2. Inform Contractor, IEC, ER and EPD; 3. Discuss with IEC and Contractor on remedial actions required; 4. Assess the effectiveness of Contractor's remedial actions; 5. If exceedance continues, arrange meeting with IEC and ER.	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 ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consolidation with the IEC, agree with the Contractor on the remedial measures to be implemented; 4. Supervise implementation of remedial measures; 5. Conduct meeting with ET and IEC if exceedance continues and instruct the Contractor to slow down or stop the process until the exceedance is abated..	1. Discuss with ET and IEC on proper remedial actions; 2. Submit proposals for remedial actions to ER and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; 5. Slow down or stop the process as determined by the ER until the exceedance is abated.

5.8 Mitigation Measures

5.8.1 Mitigation measures for dust and VOC control are recommended in the EIA Report. The Contractor shall be responsible for the design and implementation of these measures.

5.8.2 In order to ensure compliance with the acceptable criteria at the ASRs at all time, requirements of the *Air Pollution Control (Construction Dust) Regulation* shall be adhered to during the construction period. Misting for any stockpile of materials and provision of windbreaks on three sides are proposed to prevent wind erosion. An environmental monitoring and auditing program shall be implemented to monitor the construction process in order to enforce controls and modify methods of work if dusty conditions are arisen. In addition, the following good site practices are recommended to minimise dust and other air pollutants impacts during soil excavation, transportation, loading and unloading the excavated contaminated soils:

- Excavation profiles should be properly designed and executed.
- The excavation area should be limited to as small in size as possible and backfilled with clean and/or treated soil shortly after excavation work.
- The exposed excavated area shall be covered by the tarpaulin during night time.
- The top layer soils shall be sprayed with fine misting of water immediately before the excavation.
- Stockpiling site(s) shall be lined with impermeable sheeting and bunded. Stockpiles shall be fully covered by impermeable sheeting to reduce dust and other air pollutants emission.
- Misting for the dusty material shall be carried out before being loaded into the vehicle.
- Any vehicle with an open load carrying area shall have properly fitted side and tail boards.
- Material having the potential to create dust shall not be loaded from a level higher than the side and tail boards and shall be dampened and covered by a clean tarpaulin.
- The tarpaulin shall be properly secured and shall extent at least 300 mm over the edges of the sides and tailboards. The material shall also be dampened if necessary before transportation.
- The vehicles shall be restricted to maximum speed of 10 km per hour and confined haulage and delivery vehicle to designated roadways insider the site. On-site unpaved roads shall be compacted and kept free of lose materials.
- Vehicle washing facilities should be provided at every vehicle exit point.
- The area where vehicle washing takes place and the section of the road between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores.
- Every main haul road should be scaled with concrete and kept clear of dusty materials or sprayed with water so as to maintain the entire road surface wet.
- Every stock of more than 20 bags of cement should be covered entirely by impervious sheeting placed in an area sheltered on the top and the three sides.
- Every vehicle should be washed to remove any dusty materials from its body and wheels before leaving the construction sites.

5.8.3 The mitigation measures shall be implemented during the process of solidification and biopiling are described as follows.

Solidification

- The solidification pit/area shall be provided with dust suppression measures. .
- Handling and mixing of cement shall follow Air Pollution Control (Construction Dust) Regulation to limit cement emission.
- The bin should be covered during residence period after mixing process.

Biopiling

- During the course of biopile formation, the stockpiled soils at the biopiles shall be covered by tarpaulin or low permeable sheet to avoid fugitive emissions of dust or any air pollutants from the biopiles affecting the surrounding environment and to minimise runoff from the stockpiled soils. Biopile(s) shall be covered by impermeable sheeting (such that no longer than 5m of a biopile shall be exposed to open air) to avoid fugitive emissions of dust or any pollutants from the biopile(s).
- Upon formation of a biopile, the biopile shall be covered by low permeable geotextiles to prevent dust emission and runoff.
- During the operation of biopile, the biopiles shall be fully covered to control the extraction of VOCs.
- Carbon absorber with 99% control efficiency shall be installed for the biopiling system to treat the off-gas prior to discharge and the location of the exhaust of the carbon filter should be sited as far away as possible from the nearby ASRs.
- Spent activated carbon of the carbon absorber shall be replaced regularly such that the VOC emission rate from the system is acceptable (i.e. the measured TVOC is below 20 ppm). The carbon adsorption system should also be monitored regularly to check the performance of the carbon filter.
- Gas samples at the exhaust of the carbon filter for VOCs should be monitored regularly. The biopile operation shall be terminated when unacceptable air quality is monitored at the site boundary. Resumption of biopiling will only be allowed after confirmation and implementation of appropriate mitigation measures.

5.8.4 The implementation schedule for the recommended air quality impact mitigation measures is presented in **Appendix A**.