

Kowloon Canton Railway  
Corporation

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**KSL GSA 5100**  
**Environmental Impact**  
**Assessment &**  
**Associated Services**

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Environmental Monitoring  
and Audit Manual

Kowloon Canton Railway Corporation  
**KSL GSA 5100 Environmental Impact Assessment & Associated  
Services**

Environmental Monitoring and Audit Manual

January 2005



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**ABBREVIATION**

AMO	Antiquities and Monuments Office
ANL	Acceptable Noise Level
ASR	Air Sensitive Receiver
BNL	Basic Noise Level
CAR	Canton Road
CED	Civil Engineering Department
CNP	Construction Noise Permit
C&D	Construction & Demolition
CRPB	Canton Road Plant Building
ECS	Environmental Control System
EIA	Environmental Impact Assessment
EIAO	Environmental Impact Assessment Ordinance
EM	Environmental Manager
EMP	Environmental Management Plan
EMIS	Environmental Mitigation Implementation Schedule
EM&A	Environmental Monitoring and Audit
EP	Environmental Permit
EPD	Environmental Protection Department
ER	Engineer's Representative
ET	Environmental Team
ETS	East Tsim Sha Tsui
ETWBTC	Environment, Transport and Works Bureau Technical Circular
FMPHQ	Former Marine Police Headquarters
HKCC	Hong Kong Cultural Centre
HKPSG	Hong Kong Planning Standards and Guidelines
HKSM	Hong Kong Space Museum
HOKLAS	Hong Kong Laboratory Accreditation Scheme
HRVB	Haiphong Road Ventilation Building
HVS	High Volume Sampler
IEC	Independent Environmental Checker
KCRC	Kowloon Canton Railway Corporation
KSL	Kowloon Southern Link
LCSD	Leisure and Cultural Services Department
NAC	Nam Cheong Station
NCO	Noise Control Ordinance
NSRs	Noise Sensitive Receivers
OFSB	Old Fire Station Buildings
PCW	Prescribed Construction Work
PME	Powered Mechanical Equipment
PPE	Personal Protection Equipment
RAP	Remediation Assessment Plan
SLM	Sound Level Meter
SWL	Sound Power Level
TBM	Tunnel Boring Machine
TMs	Technical Memoranda
TM-CW	Technical Memorandum on Noise from Construction Work other than Percussive Piling
TM-DA	Technical Memorandum on Noise from Construction Work in Designated Areas
TM-Water	Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters
TSP	Total Suspended Particulates
TST	Tsim Sha Tsui
WKN	West Kowloon Station
WMP	Waste Management Plan
WPCO	Water Pollution Control Ordinance
WR	West Rail
YMT	Yau Ma Tei

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## 1. INTRODUCTION

### 1.1 Project Background

The proposed Kowloon Southern Link (KSL) project is classified as a designated project under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO). In accordance with the requirements of Section 5(1) of the EIAO, a project profile (No. PP-160/2002) was submitted to Environmental Protection Department (EPD) for the application of an EIA Study Brief on 21 January 2002. Pursuant to Section 5(7)(a) of the EIAO, EPD issued to the Kowloon Canton Railway Corporation (KCRC) a study brief (ref: EIA Study Brief No: ESB-097/2002 dated March 2002) to carry out an EIA study.

The proposed 3.7km underground railway will connect the new KCRC East TST Station to the current West Rail (WR) Nam Cheong Station (NAC), with its alignment running under Salisbury Road, Canton Road and West Kowloon Reclamation area (Figure 1-1). West Kowloon Station (WKN) will be located at West Kowloon on the west side of Canton Road between Austin Road and Jordan Road. Neither reclamation nor dredging is anticipated for KSL.

There are two ventilation / plant buildings for the KSL as follows:

- YMT ventilation building located at Hoi Ting Road, and between YMT Interchange and Cherry Street; and
- Canton Road Plant Building (CRPB) at the junction of Kowloon Park Drive and Canton Road.

### 1.2 Construction Programme

The construction work will commence in early 2005 and is scheduled to be completed by late 2007. Testing and commissioning of the railway system will then be conducted for target completion for operation in late 2008 / early 2009. All construction works will be undertaken during normal working hours from 7:00 am to 7:00 pm, except for the TBM launching shaft to the south of WKN, which would operate for 24 hours. A tentative construction programme is given in **Appendix 1-1**.

### 1.3 Environmental Mitigation Implementation Schedule

Detailed EIA assessments have been discussed and presented in the EIA report. All necessary mitigation measures have also been identified and recommended. The Environmental Mitigation Implementation Schedule (EMIS) is given in **Appendix 1-2**. It specifies the extent, locations, time frame and responsibilities for the implementation of the environmental mitigation measures identified.

## 2. PURPOSES OF THIS MANUAL

This Manual outlines the monitoring and audit programme to be undertaken during the construction of the KSL. It aims to provide systematic procedures for monitoring, auditing and minimising of the environmental impacts associated with the construction activities. The purposes of this EM&A manual are to:

- guide the setup of an EM&A programme;

- ensure compliance with the recommendations as stated in EIA; and
- identify any need for additional mitigation measures or remedial action.

Relevant environmental regulations, Guidelines for Development Projects in Hong Kong, Environmental Monitoring and Audit, and recommendations in the KSL EIA report have been used to set up this Manual. This Manual contains the following:

- Responsibilities of the Contractor, the Environmental Manager (EM), Engineer's Representative (ER), Independent Environmental Checker (IEC) and Environmental Team (ET) with respect to the environmental monitoring and audit requirements during construction;
- Information on project organization and programming of construction activities for the project;
- Requirements with respect to the construction schedule and the necessary environmental monitoring and audit programme to track the varying environmental impacts;
- Details of the monitoring methodologies, including all field works, laboratory analytical procedures, quality assurance and quality control;
- Definition of Action and Limit levels;
- Establishment of Event and Action plans;
- Requirements for reviewing pollution sources and working procedures in the event of non-compliance of the environmental criteria and complaints;
- Requirements for reviewing the effectiveness of the recommended mitigation measures;
- Requirements of the Environmental Management Plan (EMP) and other deliverables for the Contractors; and
- Requirements of presentation of EM&A data and appropriate reporting procedures.

For the purpose of this manual, the ER shall refer to the Engineer as defined in the Contract, in cases where the Engineer's powers have been delegated to the ER, in accordance with the Contract. The ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the environmental monitoring and audit requirements.

### 3. PROJECT ORGANISATION

An organisation consisting of EM, IEC, Contractor's ET, ER and Contractor shall be formed to take the responsibilities of the environmental protection matters. The project organisation and lines of communication with respect to environmental protection works are shown in **Appendix 3-1**. The responsibilities of respective parties are detailed in the following:

#### 3.1.1 *Environmental Manager*

The EM shall be employed by KCRC and shall be responsible for:

- Supervise the EM&A Programme, its members and the timely production and quality of outputs;
- Provide guidance to KCRC personnel in their dealings with the Contractor's ET;

- Ensure achieving the agreed objectives and deadlines as set out in this Manual; and
- Ensure the quality of deliverables.

### 3.1.2 *Independent Environmental Checker*

An IEC shall be appointed by KCRC to audit and verify the overall environmental performance of KSL and to assess the effectiveness of the ET in their duties. The main duties of IEC are to:

- review and comment on Contractor's environmental submissions as per the Environmental Permit;
- arrange and conduct monthly site inspections at the different works area along KSL alignment;
- review the programme of work to anticipate any potential environmental impacts that may arise;
- ensure the impact monitoring is conducted at the correct locations at the correct frequency as identified in this Manual;
- check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- report the findings of site inspections and other environmental performance reviews to EM and EPD.

### 3.1.3 *Contractor's Environmental Team*

The duties of the Contractor's ET are to:

- set up all the required environmental monitoring stations;
- monitor various environmental parameters for both baseline and impact monitoring as required by this Manual;
- investigate and audit the Contractor's equipment and work methodologies with respect to pollution control and environmental mitigation, and to anticipate environmental issues that may require mitigation before the problem arises;
- audit and prepare audit reports on the environmental monitoring data and the site environmental conditions;
- report the environmental monitoring and audit results to the Contractor and the ER;
- undertake regular on-site audits/inspections and report to the Contractor and the ER of any potential non-compliance; and
- follow up and close out of the non-compliance actions.

### 3.1.4 *Engineer's Representative*

The ER shall:

- monitor the Contractor's compliance with Contract Specifications, including the effective implementation and operation of the environmental mitigation measures;

- instruct the Contractor to follow the agreed protocols or those in the Contract Specifications in the event of exceedances or complaints; and
- comply with the agreed Event Contingency Plan in the event of any exceedance.

### 3.1.5 *Contractor*

The Contractor shall:

- employ an ET to undertake monitoring, auditing, laboratory analysis and reporting of EM&A;
- work within the scopes of the construction Contract and other tender conditions with respect to environmental requirements;
- cooperate with the environmental performance review undertaken by KCRC and the ER and undertake any corrective actions as instructed by the ER;
- operate and strictly adhere to the guidelines of the EMP developed by their project staff; and
- procure, implement and maintain a Continuous Noise Monitoring System (CNMS) throughout the construction period.

## 4. ENVIRONMENTAL SUBMISSION

The Contractor shall prepare the EMP, Construction Method Statement, Waste Management Plan (WMP) and obtain approval from ER and EPD to encompass the recommended environmental protection/mitigation measures with respect to the latest construction methodology and programme.

### 4.1 Environmental Management Plan

A systematic EMP shall be set up by the Contractor to ensure effective implementation of the mitigation measures, monitoring and remedial requirements presented in the EIA, EM&A and EMIS. KCRC and the IEC will audit the implementation status against the EMP and advise the necessary remedial actions required. These remedial actions shall be enforced by the ER through contractual means.

The EMP will require the Contractor (together with its sub-contractors) to define in details how to implement the recommended mitigation measures in order to achieve the environmental performance defined in the Hong Kong environmental legislation and the EIA documentation.

The review of on-site environmental performance shall be undertaken by KCRC and IEC through a systematic checklist and audit once the construction commences. The environmental performance review programme comprises a regular assessment on the effectiveness of the EMP.

### 4.2 Construction Method Statement

In case the Contractor would like to adopt a different construction method or implementation schedule, it is required to submit details of methodology and equipment to the ER for approval before the commencement of the work. Any changes in construction method shall be reflected in a revised EMP or the Contractor will be required to demonstrate the manner in which the existing EMP should accommodate the proposed changes. The Contractor may need to apply for a

Further Environmental Permit (FEP) from EPD before commencement of any construction activities.

### 4.3 Waste Management Plan

The Contractor shall prepare a WMP for the construction of the project and submit to the ER and EPD for approval. Where waste generation is unavoidable, the opportunities for recycling or reusing should be maximised. If wastes cannot be recycled, recommendations for appropriate disposal routes should be provided in the WMP. A method statement for stockpiling and transportation of the excavated materials and other construction wastes should also be included in the WMP and approved before the commencement of construction. All mitigation measures arising from the approved WMP shall be fully implemented.

For the purpose of enhancing the management of Construction and Demolition (C&D) materials including rock, and minimising its generation at source, construction would be undertaken in accordance with the Environment, Transport and Works Bureau Technical Circular (Works) No. 33/2002 - Management of Construction and Demolition Material Including Rock, or its latest versions. The management measures stipulated in the Technical Circular should be incorporated into the WMP.

## 5. ENVIRONMENTAL MONITORING

### 5.1 Air quality

#### 5.1.1 *Monitoring Parameters*

Monitoring and audit of the Total Suspended Particulate (TSP) levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely actions taken to rectify the situation.

1-hour and 24-hour TSP levels shall be measured to indicate the impacts of construction dust. The TSP levels shall be measured using the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, USA, Chapter 1 (Part 50), Appendix B. Upon approval by the ER, 1-hour TSP levels can be measured by direct reading methods which are capable of producing comparable results as that by the high volume sampling method, to indicate short event impacts.

All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of the sampler, identification and weight of the filter paper, and other special phenomena and work progress of the concerned site etc. shall be recorded down in details. A sample data sheet is shown in **Appendix 5-1**.

#### 5.1.2 *Monitoring Equipment*

High volume sampler (HVS) complying with the following specifications shall be used for carrying out the 1-hr and 24-hr TSP monitoring:

- 0.6-1.7 m<sup>3</sup>/min (20-60 SCFM) adjustable flow range;
- equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm<sup>2</sup> (63 in<sup>2</sup>);

- flow control accuracy: +/- 2.5% deviation over 24-hr sampling period;
- equipped with a shelter to protect the filter and sampler;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;
- able to hold and seal the filter paper to the sampler housing at horizontal position;
- easy to change the filter; and
- capable of operating continuously for 24-hr period.

The ET Leader shall be responsible for provision, installation and maintenance of the monitoring equipment. He shall ensure that sufficient number of HVSs with an appropriate calibration kit are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals. All the equipment, calibration kit, filter papers, etc. shall be clearly labelled. The equipment installation location shall be proposed by the ET Leader and agreed with the ER and EPD in consultation with the IEC.

Initial calibration of dust monitoring equipment shall be conducted upon installation and thereafter at bi-monthly intervals. 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. All the data shall be converted into standard temperature and pressure condition.

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 down in the data sheet as mentioned in **S5.1.1**.

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

Wind data monitoring equipment shall also be provided and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall be proposed by the ET Leader and agreed with the ER. For installation and operation of wind data monitoring equipment, the following points shall be observed:

- the wind sensors shall be installed on masts at an elevated level 10m above ground so that they are clear of obstructions or turbulence caused by the buildings;
- the wind data shall be captured by a data logger and downloaded for processing at least once a month;
- the wind data monitoring equipment shall be re-calibrated at least once every six months; and
- wind direction shall be divided into 16 sectors of 22.5 degrees each.



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

### 5.1.3 *Laboratory Measurement/Analysis*

A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments, to handle the dust samples, shall be employed for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.

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 ER and the measurement procedures shall be witnessed by the ER. The ET Leader shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his reference.

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

After sampling, the filter paper loaded with dust shall be kept in a clean and tightly sealed plastic 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 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

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

### 5.1.4 *Monitoring Locations*

The proposed dust monitoring locations are shown in Table 5-1 and illustrated in **Figures 5-1-1 to 5-1-3**. The status and locations of dust sensitive receivers may change after issuing this Manual. In such cases, the ET Leader shall propose updated monitoring locations and seek approval from ER, IEC and EPD.

**Table 5-1:** Proposed dust monitoring locations

ID	Description
AM1	Hong Kong Cultural Centre
AM2	No.4-8 Canton Road
AM3	Lai Chack Middle School
AM4	Man King Building
AM5	Charming Garden
AM6	Olympic City Phase 3 <sup>[1]</sup>

Note:

[1] Dust monitoring will be undertaken at this location only when the development is occupied.

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

- at the site boundary or such locations close to the major dust emission source;
- close to the sensitive receptors;
- proper position/sitting and orientation of the monitoring equipment; and
- take into account the prevailing meteorological conditions.

When positioning the samplers, the following points shall be noted:

- a horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
- no two samplers should be placed less than 2 meter apart;
- 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;
- a minimum of 2 metres separation from walls, parapets and penthouses is required for rooftop samplers;
- a minimum of 2 metres separation from any supporting structure measured horizontally is required;
- no furnace or incinerator flue is nearby;
- airflow around the sampler is unrestricted;
- the sampler is more than 20 metres from the drip-line;
- any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the samplers.

#### 5.1.5 *Baseline Monitoring*

The ET shall carry out baseline monitoring at all designated monitoring locations for at least 14 consecutive days prior to the commencement of the construction works to obtain daily 24-hr TSP samples. 1-hour sampling shall also be done at least 3 times per day while the highest dust impact is expected. During the baseline monitoring, there should not be any construction or dust generating activities in the vicinity of the monitoring stations. A schedule on the baseline monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be approved prior by the ER and agreed with IEC.

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

Ambient conditions may vary seasonally and shall be reviewed at every three months. If the ET Leader considers that the ambient conditions have been changed and a repeat of the baseline monitoring is required for obtaining the updated baseline levels, the monitoring shall be conducted at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. Should change in ambient conditions be determined, the baseline levels and, in turn, the air quality criteria, should be revised. The revised baseline levels and air quality criteria should be agreed with EPD and IEC.

### 5.1.6 Impact Monitoring

The ET shall carry out impact monitoring during the course of the construction. For regular impact monitoring, the sampling frequency of at least once in every six-days, shall be strictly complied with at all monitoring stations for 24-hr TSP monitoring. For 1-hr TSP monitoring, the sampling frequency of at least three times in every six-days shall be undertaken when the highest dust impact occurs. The specific time to start and stop the 24-hr TSP monitoring shall be clearly defined for each location and be strictly followed by the operator.

In case of non-compliance with the air quality criteria, more frequent monitoring exercise, as specified in the Action Plan in **S5.1.7**, shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive dust emission or the deterioration in air quality is rectified.

### 5.1.7 Event and Action Plan For Air Quality

The baseline monitoring results form the basis for determining the air quality criteria, namely Action and Limit levels, for the impact monitoring. The ET Leader shall compare the impact monitoring results with air quality criteria set up for 24-hour and 1-hour TSP levels. Table 5-2 shows the Action and Limit levels. Should non-compliance of the air quality criteria occurs, the ET, the ER and the Contractor shall undertake the relevant actions in accordance with the Event and Action Plan in Table 5-3.

**Table 5-2:** Action and limit levels for air quality

Parameters	Action	Limit
24-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 200 \mu\text{g}/\text{m}^3$ , Action level = (130% of baseline level + Limit level)/2 For baseline level $> 200 \mu\text{g}/\text{m}^3$ , Action level = Limit level	260
1-hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level $\leq 384 \mu\text{g}/\text{m}^3$ , Action level = (130% of baseline level + Limit level)/2 For baseline level $> 384 \mu\text{g}/\text{m}^3$ , Action level = Limit level	500

**Table 5-3:** Event/Action plan for air quality

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

Event	Action			
	ET Leader	IEC	ER	Contractor
	arrange meeting with IEC and ER. 8. If exceedance stops, cease additional monitoring.	remedial measures.		
<b>Limit Level</b>				
1. Exceedance for one sample	<ol style="list-style-type: none"> <li>Identify source, investigate the causes of exceedance and propose remedial measures.</li> <li>Inform ER and EPD.</li> <li>Repeat measurement to confirm finding.</li> <li>Increase monitoring frequency to daily.</li> <li>Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.</li> </ol>	<ol style="list-style-type: none"> <li>Check monitoring data submitted by ET.</li> <li>Check the Contractor's working method.</li> <li>Discuss with ET Leader and the Contractor on possible remedial measures.</li> <li>Advise ER on the effectiveness of the proposed remedial measures.</li> <li>Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>Confirm receipt of notification of exceedance in writing.</li> <li>Notify the Contractor.</li> <li>Ensure remedial measures properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>Take immediate action to avoid further exceedance.</li> <li>Submit proposals for remedial actions to IEC within 3 working days of notification.</li> <li>Implement the agreed proposals.</li> <li>Amend proposal if appropriate.</li> </ol>
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>Notify IEC, ER, EPD and the Contractor.</li> <li>Identify the source.</li> <li>Repeat measurements to confirm findings.</li> <li>Increase monitoring frequency to daily.</li> <li>Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented.</li> <li>Arrange meeting IEC and ER to discuss the remedial actions to be taken.</li> <li>Assess effectiveness of the Contractor's remedial actions and keep IEC, EPD and ER informed of the results.</li> <li>If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>Discuss amongst ER, ET Leader and the Contractor on the potential remedial actions.</li> <li>Review the Contractor's remedial actions whenever necessary and advise ER accordingly.</li> <li>Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>Confirm receipt of notification of exceedance in writing.</li> <li>Notify the Contractor.</li> <li>In consultation with IEC, agree with the remedial measures to be implemented.</li> <li>Ensure remedial measures are properly implemented.</li> <li>If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated.</li> </ol>	<ol style="list-style-type: none"> <li>Take immediate action to avoid further exceedance.</li> <li>Submit proposals for remedial actions to IEC within 3 working days of notification.</li> <li>Implement the agreed proposals.</li> <li>Resubmit proposals if problem still not under control.</li> <li>Stop the relevant activity of works as determined by ER until the exceedance is abated.</li> </ol>

## 5.2 Airborne Construction Noise

### 5.2.1 Monitoring Parameters

The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level ( $L_{Aeq}$ ).  $L_{Aeq,30\text{ mins}}$  shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods (including restricted hours),  $L_{Aeq,5\text{ mins}}$  shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.

As supplementary information for data auditing, statistical results such as  $L_{10}$  and  $L_{90}$  shall also be obtained for reference. A sample data record sheet is shown in **Appendix 5-1** for reference.

### 5.2.2 *Monitoring Equipment*

In accordance with the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications shall be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement, the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0dB.

The ET Leader shall be responsible for the provision, installation and maintenance of the monitoring equipment. He shall ensure that sufficient noise monitoring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation shall be clearly labelled. The location of equipment installation should be proposed by the ET Leader and agreed with the ER and EPD in consultation with the IEC.

Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

### 5.2.3 *Monitoring Locations*

The noise monitoring locations are shown in **Figures 5-2-1 to 5-2-3** and summarised in Table 5-4. The status and locations of Noise Sensitive Receivers (NSRs) may change after issuing this Manual. In such cases, the ET Leader should propose updated monitoring locations and seek approval from ER, IEC and EPD.

**Table 5-4:** Proposed airborne construction noise monitoring locations

ID	Description
NM1	Hong Kong Cultural Centre
NM2	No.4-8 Canton Road
NM3	Lai Chack Middle School
NM4	Man King Building
NM5	Charming Garden
NM6	Olympic City Phase 3 <sup>[1]</sup>

Note:

[1] Construction noise monitoring will be undertaken at this location only when the development is occupied.

When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria:

- at locations close to the major site activities which are likely to have noise impacts;
- close to the noise sensitive receivers; and
- for monitoring locations in the vicinity of the sensitive receivers, care should be taken to avoid disturbance to the occupants during monitoring.

The monitoring station shall normally be at a point 1m from the exterior of the sensitive receivers building facade and be at a position 1.2m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made. For reference, a correction of +3dB(A) shall be made to the free field measurements. The ET Leader shall agree with the IEC on the monitoring positions and the

corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

#### 5.2.4 *Baseline Monitoring*

The ET shall carry out baseline noise monitoring prior to the commencement of the construction works. There shall not be any construction activities in the vicinity of the stations during the baseline monitoring. Continuous baseline noise monitoring for the A-weighted levels  $L_{Aeq}$ ,  $L_{A10}$  and  $L_{A90}$  shall be carried out daily for a period of at least two weeks in a sample period of 5 minutes or 30 minutes between 0700 and 1900, and 5 minutes between 1900 and 0700. A schedule on the baseline monitoring shall be submitted to the ER and IEC for approval before the monitoring starts.

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

#### 5.2.5 *Impact Monitoring*

During normal construction working hour (0700-1900 Monday to Saturday), monitoring of  $L_{Aeq, 30min}$  noise levels (as six consecutive  $L_{Aeq, 5min}$  readings) shall be carried out at the agreed monitoring locations once every week in accordance with the methodology in the TM.

Other noise sources such as road traffic may make a significant contribution to the overall noise environment. Therefore, the results of noise monitoring activities will take into account such influencing factors, which may not be presented during the baseline monitoring period.

In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Event and Action Plan in **S5.2.7** shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

#### 5.2.6 *Continuous Noise Monitoring*

The Contractor shall also procure, implement and maintain a Continuous Noise Monitoring System (CNMS) throughout the construction period, as recommended in the EIA Report. The continuous noise monitoring locations are shown in **Figure 5-3** and summarised in Table 5-5. The status and locations of NSRs may change after issuing this Manual. In such cases, the ET Leader should propose updated monitoring locations and seek approval from ER, IEC and EPD.

**Table 5-5:** Locations of continuous noise monitoring

ID	Description
CM1	Lai Chack Middle School
CM2	Man King Building

##### 5.2.6.1 System Requirements

The objectives of implementing the CNMS are summarized below:

- Measure various noise data (different measurement parameters) at designated locations continuously during specified period(s);
- Transmit the measured noise data electronically to a central computer system within the required time frame;

- Upload the measurement data to KCRC's web site in an agreed format for public inspection;
- Maintain and keep all the measurement data in an agreed format during the entire construction period for subsequent analysis, where necessary.

The general configuration of the CNMS is described below. Subject to comments / approval from KCRC, EPD and IEC, the Contractor may propose alternative configurations to achieve the same or better performance.

- Sound Level Meters (SLMs);
- Wireless data transmitters and receivers;
- Modems;
- Computer system (completed with necessary software and connection to Internet);
- Power supply; and
- Security measures.

The general requirements of the above components of the CNMS are summarized in the following table. Detail requirements will be further elaborated in the Particular Specification.

**Table 5-6** General requirements of CNMS

Equipment / Components	General Requirements
SLMs (with data logger)	<ul style="list-style-type: none"> <li>• Be suitable for outdoor use</li> <li>• Comply with IEC 651:1979 (Type 1), 804:1985 (Type 1) and 1672/EN61672 Class 1 requirements</li> </ul>
Wireless data transmitters and receivers	<ul style="list-style-type: none"> <li>• Be suitable for outdoor use</li> <li>• Transfer noise measurement data from the SLMs to the receiver wirelessly</li> <li>• Transmission power / frequency should be suitable and adequate for the local conditions</li> </ul>
Modems	<ul style="list-style-type: none"> <li>• Transfers measurement data to the computer system</li> </ul>
Computer system	<ul style="list-style-type: none"> <li>• Complete with the necessary software (eg spreadsheet, word processor and internet access) for data processing</li> <li>• Process the measurement data into the agreed format</li> <li>• Upload the processed data (incl tables, charts, trends etc) to KCRC's website which should allow the user (incl the public) to search previous measurement data</li> <li>• Provided with sufficient memory to keep the measurement data for further use</li> </ul>
Power supply	<ul style="list-style-type: none"> <li>• Complete with all cabling and connection to power supply</li> <li>• Complete with appropriate backup power supply for SLMs, transmitters / receivers and computer system</li> </ul>
Security measures	<ul style="list-style-type: none"> <li>• Complete with security measures to prevent unnecessary human interference and damage</li> </ul>

All SLMs shall be calibrated against a portable acoustic calibrator once every 2 weeks. The portable acoustic calibrator shall be traceable to international reference source. Calibration records shall be stored for further reference. Full annual calibration is required every year and the full set of noise monitoring system will be sent back to the manufacturer (or other approved agency). Temporary replacement would be required to maintain uninterrupted noise measurements.

#### 5.2.6.2 Noise Parameters

A summary of the noise parameters to be measured by the CNMS is given in Table 5-7 below.

**Table 5-7** Summary of noise parameters for CNMS

Period	Parameters
Weekdays 0700-1900 hours	$L_{eq}$ (30min) <ul style="list-style-type: none"> <li>in 6 consecutive <math>L_{eq}</math> (5 min) measurements</li> </ul> Other parameters in $L_{10}$ , $L_{90}$ and $L_{max}$ should also be measured
Restricted hours 1900-0700 hours from Monday to Saturday at any time on Sundays or public holidays)	$L_{eq}$ (15 min) <ul style="list-style-type: none"> <li>in 3 consecutive <math>L_{eq}</math>(5 min) measurements</li> </ul> Other parameters in $L_{10}$ , $L_{90}$ and $L_{max}$ should also be measured

### 5.2.6.3 Implementation Responsibility

A summary of the implementation responsibilities for the CNMS is given in Table 5-8 below.

**Table 5-8** Summary of implementation responsibilities for CNMS

Party	Implementation Responsibilities
EPD	<ul style="list-style-type: none"> <li>Review and comment on the Method Statement to be submitted by the Contractor</li> </ul>
KCRC	<ul style="list-style-type: none"> <li>Review, comment and approve the Method Statement to be submitted by the Contractor</li> <li>Maintain a website to display the measured noise data for public inspection throughout the entire construction period</li> </ul>
The Engineer Representative	<ul style="list-style-type: none"> <li>Ensure all the EP requirements are incorporated into the Particular Specification for the procurement of the CNMS.</li> <li>Ensure the CNMS is installed and operated in a safe manner and satisfy other legislative requirements (eg power supply).</li> </ul>
Independent Environmental Checker (IEC)	<ul style="list-style-type: none"> <li>Comments on and verify the Method Statement to be submitted by the Contractor</li> <li>Verify and upload the verified data (incl plots) and Actions / Limit Levels onto KCRC's website before midnight of the next day</li> <li>Verify the calibration records to be provided by the ET</li> </ul>
Contractor	<ul style="list-style-type: none"> <li>Submit a detailed Method Statement before the procurement of the CNMS to state the proposed equipment, configuration and other operational / maintenance details to IEC, KCRC and EPD for approval.</li> <li>Procure, install and maintain the CNMS throughout the construction period for the impact monitoring</li> <li>Arrange site access for the installation of the CNMS</li> <li>Maintain necessary spare parts to maintain un-interrupted operation of the CNMS.</li> <li>Provide all necessary power supply / connection and security measures</li> </ul>
Environmental Team	<ul style="list-style-type: none"> <li>Submit the measurement data in an agreed format to IEC, KCRC and Contractor within one working day.</li> <li>Conduct regular calibration of the SLMs and the CNMS as specified.</li> <li>Maintain field data sheet to record meteorological data and site observations for further reference.</li> </ul>

### 5.2.7 Event and Action Plan for Construction Noise

The Action and Limit levels for construction noise are defined in Table 5-9. Should non-compliance of the criteria occur, actions in accordance with the Action Plan in Table 5-10 shall be carried out.



**Table 5-9:** Action and limit levels for construction noise

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented complaint is received	75 <sup>[1]</sup> dB(A)
0700-2300 hrs on holidays; and 1900-2300 hrs on all other days		65/70 <sup>[2]</sup> dB(A)
2300-0700 hrs of next day		50/55 <sup>[2]</sup> dB(A)

Note:

[1] For school, 70 dB(A) for schools and 65 dB(A) during school examination periods.

[2] Limit depends on Area Sensitivity Rating (ASR). For monitoring locations located at Canton Road (from Salisbury Road to Kowloon Park Drive) and Haiphong Road, the ASR should be "B" and hence the limit should be 65dB(A) and 50dB(A) for the period 0700-2300 and 2300-0700, respectively. For monitoring locations located at other sections, the ASR should be "C" and hence the limit should be 70dB(A) and 55dB(A) for the period 0700-2300 and 2300-0700, respectively.

**Table 5-10** Event/Action plan for airborne construction noise

Event	Action			
	ET Leader	IEC	ER	Contractor
<b>Action Level</b>	<ol style="list-style-type: none"> <li>1. Notify IEC and the Contractor.</li> <li>2. Carry out investigation.</li> <li>3. Report the results of investigation to IEC and the Contractor.</li> <li>4. Discuss with the Contractor and formulate remedial measures.</li> <li>5. Increase monitoring frequency to check mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review with analysed results submitted by ET.</li> <li>2. Review the proposed remedial measures by the Contractor and advise ER accordingly.</li> <li>3. Supervise the implement of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance in writing.</li> <li>2. Notify the Contractor.</li> <li>3. Require the Contractor to propose remedial measures for the analysed noise problem.</li> <li>4. Ensure remedial measures are properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit noise mitigation proposals to IEC.</li> <li>2. Implement noise mitigation proposals.</li> </ol>
<b>Limit Level</b>	<ol style="list-style-type: none"> <li>1. Identify the source.</li> <li>2. Notify IEC, ER, EPD and the Contractor.</li> <li>3. Repeat measurement to confirm findings.</li> <li>4. Increase monitoring frequency.</li> <li>5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented.</li> <li>6. Inform IEC, ER, and EPD the causes &amp; actions taken for the exceedances.</li> <li>7. Assess effectiveness of the Contractor's remedial actions and keep IEC, EPD and ER informed of the results.</li> <li>8. If exceedance stops, cease additional monitoring</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst ER, ET Leader and the Contractor on the potential remedial actions.</li> <li>2. Review the Contractor's remedial actions whenever necessary to assure their effectiveness and advise ER accordingly.</li> <li>3. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance in writing.</li> <li>2. Notify the Contractor.</li> <li>3. Require the Contractor to propose remedial measures for the analysed noise problem.</li> <li>4. Ensure remedial measures are properly implemented.</li> <li>5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance.</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification.</li> <li>3. Implement the agreed proposals.</li> <li>4. Resubmit proposals if problem still not under control.</li> <li>5. Stop the relevant activity of works as determined by the ER until the exceedance is abated.</li> </ol>

To account for cases where ambient noise levels as identified by baseline monitoring approach or exceed the stipulated Limit Levels prior to commencement of construction, a Maximum Acceptable Impact Level may be defined and agreed with EPD, which incorporates the baseline noise levels and the identified construction noise Limit Level. The amended level will therefore be greater than 75dB(A) and will represent the maximum acceptable noise level at a specific monitoring station. Correction factors for the effects of acoustic screening and/or architectural features of NSRs may also be applied for as specified in the TM.

For the purposes of compliance checking, after taking into account any adjustments agreed with EPD, comparison with either the Limit or the Maximum Acceptable Impact Level shall represent the governing criteria for noise impact assessment.

For continuous noise monitoring, in cases where the levels exceeds the Action / Limit Levels (see **S5.2.7**), the hourly site log shall be examined to check whether the exceedance is caused by extraneous activities. The ET is required to investigate whether the exceedance is caused by KCRC's site activities or other extraneous noise sources. The site log should contain brief description of prevailing wind speeds and weather, once for am and once for pm each day. A short explanation of the causes of any exceedance of Action / Limit Levels shall accompany the plots.

### 5.3 Construction Groundborne Noise

Prediction of construction groundborne noise indicates the criteria will be achieved and mitigation measures are not required. In order to ensure proper control of groundborne noise is executed by the contractor, a monitoring requirement is recommended at the worksites in front of the HKCC and HKSM for assurance checking. Rock breaking activities will be subject to an assurance groundborne noise measurement at one selected location each inside HKCC and HKSM to be agreed with their respective operators. If groundborne noise criterion is exceeded, the monitoring shall continue daily until acceptance has been restored against the criterion. Otherwise the monitoring can be discontinued.

### 5.4 Operational Groundborne Noise

The EIA report has recommended appropriate types of trackform along the KSL alignment to mitigate the operational groundborne noise from the future KSL train operation. The contractor should ensure that these trackforms are installed accordingly and a noise commissioning test should be conducted at selected key noise sensitive receivers including Hong Kong Cultural Centre, Hong Kong Space Museum, Hong Kong Hotel and Park Avenue prior to operation of the project. A summary of the operational groundborne noise criteria for the groundborne noise sensitive receivers is given in the following table:

**Table 5-11** Operational groundborne noise criteria for HKCC, HKSM, Schools, hotel guestrooms and domestic premises

NSR Description	Groundborne Noise Criteria, dB(A)	
	Day & Evening (0700 to 2300 hrs)	Night (2300 to 0700 hrs)
HKCC - Grand Theatre, Studio Theatre, Concert Hall	25 (Lmax)	-
HKSM - Planetarium, Recording Room	25 (Lmax)	-
School - Classrooms	55 (Leq 30 mins)	-
Hotel guestrooms along Canton Road & Salisbury Road	55 (Leq 30 mins)	45 (Leq 30 mins)
Domestic premises along Canton Road	55 (Leq 30 mins)	45 (Leq 30 mins)

Note: For HKSM and HKCC, the 25dB(A) criterion is based on FTA guidance manual. It is maximum rms average over a 1 second period.

### 5.5 Operational Fixed Source Noise

The EIA report has provided the maximum allowable sound power levels for major fixed noise sources. The SWL criteria shall be implemented and refined by the Contractor. The Contractor should also carry out a noise commissioning test for all major fixed noise sources before operation of the project, in order to ensure compliance of the operational airborne noise levels with the TM's stipulated noise standard. A summary of noise criteria at NSRs is given in the following table:

**Table 5-12** Summary of noise criteria

Area	Time Period <sup>[1]</sup>	Area Sensitivity Rating	Criteria, $L_{eq, 30 \text{ min}}$ dB(A)
Along Canton Road	Day & evening	B	60
	Night	B	50
West Kowloon	Day & evening	B	60
	Night	B	50
Charming Garden	Day & evening	C	65
	Night	C	55

## 5.6 Water Quality

Contaminated groundwater from dewatering process should be recharged back into the ground at the recharging wells. The recharge wells shall be located at places where the groundwater quality will not be affected by the recharge operation. The Contractor shall perform ambient measurements on the groundwater quality with reference to ProPECC PN3/94 “Contaminated Land Assessment and Remediation”, prior to the selection of the recharge wells; and submit a working plan to EPD for agreement. The measurement data of the groundwater will serve as the baseline and the pollutant levels of the groundwater to be recharged shall be measured and not be higher than the baseline at the recharge well.

Groundwater monitoring wells will be installed to monitor the effectiveness of the recharge wells. The locations of the monitoring wells will be near to the recharge points and at site boundaries. During the recharge period, the groundwater and pollution level at the monitoring wells shall be monitored to ensure that there is no likelihood of locally risen groundwater level and transfer of pollutants beyond the site boundary. A control well shall also be selected to monitor the natural variation of the pollution level.

### 5.6.1 Baseline Monitoring Parameters

The chemical testing of groundwater should include the parameters and reporting limits as shown in Table 5-13 to be undertaken by a HOKLAS accredited laboratory and with individual HOKLAS accredited methods.

**Table 5-13** Groundwater testing parameters and reporting limits

Parameters	TM-Water Effluent limit for inshore waters of VHWCZ (mg/L)	Reporting Limit ( $\mu\text{g/L}$ ) <sup>[1]</sup>
pH	6-9	
Temperature °C	< 40°C	
TPH C6 – C9	---	20 –25
TPH C10–C14	---	
TPH C15 – C28	---	
TPH C29 – C36	---	
Dioxin ( $\mu\text{g/L}$ )	---	10 $\mu\text{g/L}$
Cd	0.001	
Cr	0.7	
Cu	0.7	
Ni	0.7	
Pb	0.7	
Zn	0.7	
Hg	0.001	

Parameters	TM-Water Effluent limit for inshore waters of VHWCZ (mg/L)	Reporting Limit (µg/L) <sup>[1]</sup>
As	0.7	
Ba	2.7	
Co	---	
Mo	---	
Sn	---	
Total Cyanide (µg/L)	---	
PAH <sup>[8]</sup> (µg/L)	---	0.1 – 1 (Low molecular weight) 0.02 – 0.1 (High molecular weight)
Benzene (µg/L)	---	1
Ethylbenzene (µg/L)	---	
Toluene (µg/L)	---	
Meta- & Para Xylene (µg/L)	---	
Ortho Xylene (µg/L)	---	

Note:

[1]: According to Technical Memorandum for Effluents Discharged into Drainage and Sewerage Systems Inland and Coastal Waters (TM-Water), the chemicals concentration for TPH, dioxin, BTEX and PAH should be below the Reporting limit. Discharges of PCB, PAHs, petroleum oil, pesticide and toxicant into foul sewers, inland waters and coastal waters are prohibited.

### 5.6.2 Groundwater Collection

Groundwater samples at each monitoring well should be collected with PVC bailer (or equivalent). The bailer should be decontaminated prior to use and in between sampling. The groundwater samples should be transferred to clearly labelled and pre-cleaned sample containers with necessary preservatives immediately after collection. Sufficient quantity of samples should be collected for all laboratory analyses. After collection, the groundwater samples should be stored at 0-4°C and delivered to the laboratory within 24 hours under proper chain-of-custody system.

### 5.6.3 Baseline Monitoring

- Prior to construction, ambient ground water quality measurements will be conducted for the WKN and the cut-&-cover tunnel to the north of WKN. The parameters and the associated reporting limits/TM-Water limits as shown in Table 5-12 should be adopted. Groundwater sampling should be conducted daily for 7 days. Where the concentrations of parameters exceed the relevant limits, the groundwater should be recharged within the site.
- The locations of the recharging wells shall be determined on the basis that the pollutant levels of the groundwater to be recharged shall not be higher than the baseline at the recharge well. Monitoring wells shall be selected near to the recharge points and at site boundaries. A control well shall also be selected within the site.
- A working plan shall be submitted to EPD for agreement prior to baseline measurement.
- An action level shall be developed based on the ambient water quality measurements.

#### 5.6.4 Impact Monitoring

- During the re-charging of underground water, the water level at the monitoring wells should be monitored on a daily basis to ensure that the water levels at the site boundary will not increase significantly.
- During the re-charging of underground water, the water quality at the monitoring wells and control well shall be measured on a weekly basis to ensure that the pollution levels will not increase significantly. Measurement parameters include Cd, Hg, BTEX and PAH.
- Should the pollutants of the recharging groundwater (after petrol interceptor) exceed the baseline value and there are no justifications from the measurements at the control well, the Contractor shall treat the pollutants in the recharging groundwater. Appropriate treatment would include chemical precipitation and activated carbon adsorption.

#### 5.6.5 Event and Action Plan

The event and action plan is summarized as follows:

**Table 5-14** Event and Action Plan for Groundwater Recharging

Event	Action			
	ET Leader	IEC	ER	Contractor
<b>Ground water level at recharge point exceeds 1m from baseline</b>	<ol style="list-style-type: none"> <li>1. Notify IEC and the Contractor.</li> <li>2. Carry out investigation.</li> <li>3. Report the results of investigation to IEC and the Contractor.</li> <li>4. Discuss with the Contractor and formulate remedial measures.</li> <li>5. Increase monitoring frequency to check mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review with analysed results submitted by ET.</li> <li>2. Review the proposed remedial measures by the Contractor and advise ER accordingly.</li> <li>3. Supervise the implement of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance in writing.</li> <li>2. Notify the Contractor.</li> <li>3. Require the Contractor to propose remedial measures for the analysed groundwater problem.</li> <li>4. Ensure remedial measures are properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Reduce the recharge rate AND / OR</li> <li>2. Suspend the recharge until the groundwater level at recharge points falls back to less than 1m difference with the baseline</li> </ol>
<b>Pollution level of recharging groundwater exceed the baseline level / the pollution levels at the monitoring well</b>	<ol style="list-style-type: none"> <li>1. Notify IEC and the Contractor.</li> <li>2. Carry out investigation.</li> <li>3. Report the results of investigation to IEC and the Contractor.</li> <li>4. Discuss with the Contractor and formulate remedial measures.</li> <li>5. Increase monitoring frequency to check mitigation measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review with analysed results submitted by ET.</li> <li>2. Review the proposed remedial measures by the Contractor and advise ER accordingly.</li> <li>3. Supervise the implement of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance in writing.</li> <li>2. Notify the Contractor.</li> <li>3. Require the Contractor to propose remedial measures for the analysed groundwater problem.</li> <li>4. Ensure remedial measures are properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Suspended the recharge OR</li> <li>2. Treatment of the recharging groundwater</li> </ol>

### 5.7 Cultural heritage

The ET Leader shall liaise with the FMPHQ developer to conduct structural monitoring during the construction of the mined tunnel underneath the FMPHQ to ensure compliance with Buildings Ordinance. The monitoring shall be conducted for the FMPHQ compound including

the various built heritage within the site, the disused air-raid tunnel and the Portal A to be preserved. The ET Leader shall prepare a methodology of conducting structural monitoring for submission to Antiquities and Monuments Office (AMO) and Buildings Department (BD).

In addition, before the commencement of the construction work, the Contractor shall also consult AMO on any other mitigation measures that would be required administratively or under the Antiquities and Monuments Ordinance. The Contractor shall implement these requirements from AMO during the construction period.

## 6. ENVIRONMENTAL SITE AUDIT

### 6.1 Site Inspection

Site inspections provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. They shall be undertaken routinely to inspect the construction activities to ensure appropriate environmental protection and pollution control/mitigation measures are properly implemented. With well defined pollution control and mitigation specifications and a well established site inspection, deficiency and action reporting system, site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

The ET Leader shall be responsible for formulating the environmental site inspection, deficiency and action reporting system, and carrying out the site inspection works. He shall submit a proposal on site inspection, deficiency and action reporting procedures within 21 days prior to construction commencement to the Contractor for approval from the ER and IEC.

Regular site inspections shall be carried out at least once per week. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situation outside the site area which is likely to be affected, directly or indirectly, by the site activities. The ET Leader shall make reference to the following information in conducting the inspection:

- the EIA recommendations on environmental protection and pollution control mitigation measures;
- works progress and programme;
- individual works methodology (which shall include proposal on associated pollution control measures);
- Contract Specifications on environmental protection;
- relevant environmental protection and pollution control laws; and
- previous site inspection results.

The Contractor shall update ET Leader with all relevant information of the construction Contract for him to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works shall be submitted to ER, IEC and the Contractor within 1 working day for reference and for taking immediate actions. The Contractor shall follow the procedures and time-frame as stipulated in the environmental site inspection, deficiency and action reporting system formulated by the ET Leader to report on any remedial measures subsequent to the site inspections.

Ad hoc site inspections shall also be carried out if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

## 6.2 Compliance with Legal and Contractual Requirement

There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong, which the construction activities shall comply with. In order to comply with the contractual requirements, all works method statements submitted by the Contractor to the ER and IEC for approval shall be sent to the ET Leader for vetting, to see whether sufficient environmental protection and pollution control measures have been included.

The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated, and that any foreseeable potential for violating the laws can be prevented. The Contractor shall regularly copy relevant documents to the ET Leader so that the checking work can be carried out. The document shall at least include the updated Work Progress Reports, the updated Works Programme, the application letters for different licence/permits under the environmental protection laws, and all the valid licence/permit. The site diary shall also be available for the ET Leader's inspection upon his request.

After reviewing the document, the ET Leader shall advise the ER, IEC and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works may not cope with the works programme, or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he shall also advise the Contractor, ER, and IEC accordingly.

Upon receipt of the advice, the Contractor shall undertake immediate actions to rectify the situation. The ER shall follow up to ensure that appropriate action has been taken by the Contractor such that the environmental protection and pollution control requirements are fulfilled.

## 6.3 Environmental Complaints

Complaints shall be referred to the ET Leader for carrying out complaint investigation. The ET Leader shall undertake the following procedures upon receipt of the complaints:

- log complaint and date of receipt onto the complaint database;
- investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;
- identify mitigation measures if a complaint is valid and due to works;
- advise the Contractor accordingly if mitigation measures are required;
- review the Contractor's response on the identified mitigation measures and the updated situation;
- submit interim report to ER on status of the complaint investigation and follow-up action within the time frame assigned by the ER;

- undertake additional monitoring and audit to verify the situation if necessary, and review that any valid reason for complaint does not recur;
- report the investigation results and the subsequent actions to the source of complaint for responding to complainant (If the source of complaint is EPD, the results should be reported within the time frame assigned by EPD); and
- record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

The Contractor and the ER shall also be notified of the nature of complaints. An investigation shall be initiated to determine the validity of the complaint and to identify the source of the problem. As necessary, the ER shall undertake the following steps:

- Investigation and identify the source of the problem (KCRC/ IEC or the ER may request additional dust or noise monitoring);
- Liaise with the EM to identify remedial measures;
- Require the Contractor to take action to mitigate the situation;
- Repeat monitoring to check compliance with Action and Limit level; and
- Repeat review procedures to identify further possible areas of improvement if monitoring results show exceedances.

The outcome of the investigation and the action taken shall be documented on the complaints proforma. Where possible, a formal response to each complaint received shall be prepared, within a maximum of seven days, so as to notify the concerned person(s) that action has been taken.

All enquires which trigger this process shall be reported in the monthly EM&A reports which shall include results of inspections undertaken by site staff, and details of the measures taken, and additional monitoring results. It should be noted that the receipt of complaints or enquiries will not, in itself be sufficient reason to introduce additional mitigation measures. They will however initiate the Event/ Action Plan and these procedures may lead to the introduction of mitigation measures if they are considered necessary. In all cases the complainant shall be notified of the findings of the Event/ Action Plan and audit procedures put in place to ensure that the problem does not recur.

During the complaint investigation work, the Contractor and ER shall cooperate with the ET Leader in providing all the necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor shall promptly carry out the mitigation. The ER shall ensure that the measures have been carried out by the Contractor.

A flow chart of the complaint response procedures is shown in **Appendix 6-1** and an example of complaint proforma is provided in **Appendix 6-2**.

#### 6.4 Environmental Mitigation Measures

Environmental mitigation measures have been recommended in EIA report which shall be implemented to control adverse effects on air quality, noise, water quality, wastes, land contamination, landscape and visual, and cultural heritage. The EMIS is given in **Appendix 1-2**. All mitigation measures shall be implemented properly during the entire construction period. The



Contractors shall review the recommended mitigation measures with respect to the latest construction methods and programme. The Contractor shall also liaise with the ET Leader on some other mitigation measures.

#### 6.4.1 *Dust Mitigation Measures*

The Contractor is obliged to follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation and shall be responsible for the design and implementation of the recommended dust control and mitigation measures, which shall include, but not limited to, the following:

- Proper watering on all exposed spoil should be undertaken throughout the construction phase;
- Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated within 24 hours of the excavation or unloading;
- Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads or streets;
- A stockpile of dusty material should not extend beyond the pedestrian barriers, fencing or traffic cones;
- The load of dusty materials on a vehicle leaving a construction site should be covered entirely by clean impervious sheeting to ensure that the dusty materials do not leak from the vehicle;
- Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;
- When there are open excavation and reinstatement works, hoarding of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing;
- All main haul roads should be paved with concrete, bituminous materials, hardcores or metal plates, and kept clear of dusty materials; or sprayed with water or a dust suppression chemical so as to maintain the entire road surface wet;
- The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;
- Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;
- Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;
- Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding

from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;

- Any skip hoist for material transport should be totally enclosed by impervious sheeting;
- Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;
- Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;
- Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system;
- Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies;
- The areas within 30m from the blasting area should be wetted with water prior to blasting;
- No blasting should be carried out when strong wind signal or tropical cyclone warning signal no. 3 or higher is hoisted.

By implementing these control measures and with good construction site practice, it is anticipated that dust impacts will be insignificant. It is recommended that the Contractor should undertake proper watering on all exposed spoil (with at least 4 times per day for WKN and 2 times per day for the remaining sections) throughout the construction phase. The barging facility should be designed with dust enclosures along the loading ramps to avoid dust dispersion. All road surfaces within the barging facility should be paved. Watering should be undertaken twice a day over the work area and all vehicles are required to pass through designated wheel washing facilities before leaving the barging facility.

#### 6.4.2 *Construction Noise Mitigation Measures*

The Contractor shall be responsible for the design and implementation of the construction noise control and mitigation measures, which shall include, but not limited to, the following

- Use of site hoarding as noise barrier to screen noise;
- Quiet equipment and construction method should be employed;
- Only well-maintained plant shall be operated on site and plant shall be serviced regularly during the construction work;
- Machines and plant that may be in intermittent use (such as breakers) shall be shut down between work periods or should be throttled down to a minimum;
- Mobile plant shall be sited as far away from NSRs as possible;
- Material stockpiles and other structures shall be effectively utilised, where practicable, to screen noise from on-site construction activities;

- Silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works.
- The Contractor shall proactively liaise with the School Representative on a regular basis to collate the latest information on the examination periods, and carefully arrange noisy construction activities to avoid these periods;
- Use of temporary noise barrier / acoustic mat at for mobile plants.
- Temporary enclosures should be provided for static plant including compressors, generators etc.
- The TBM launching shaft should be provided with a noise insulating cover which will be closed during restricted hours to shelter the plant items. Typical configuration of acoustic panels that can achieve this insulation requirement is 1.5mm GS outer skin, 100mm acoustic infill with 80kg/m<sup>3</sup>, and an inner perforated sheet.

The predicted construction groundborne noise impacts at NSRs are within the statutory requirements and hence mitigation measures are not required.

#### 6.4.3 *Operational Air-borne Noise Mitigation Measures*

The detailed design should incorporate the following good practice in order to minimise the nuisance on the neighbouring NSRs.

- Louvres should be orientated away from adjacent NSRs, preferably onto main roads (eg Kowloon Park Drive, West Kowloon Expressway) which are less sensitive.
- Adequate direct noise mitigation measures including silencers, acoustic louvers, acoustic enclosures should be allowed in the design for various ECS plant.
- Facade of these plant areas / ventilation shafts should have adequate sound insulation properties to minimise the noise emanating through the building fabric.

#### 6.4.4 *Operational Ground-borne Noise Mitigation Measures*

Special trackform should be implemented along the alignment to control the transmission of groundborne vibration and hence groundborne noise impacts on the neighbouring premises.

#### 6.4.5 *Water quality*

No wastewater will be discharged directly into the Victoria Harbour Water Control Zone (VHWCZ). The requirements on good site practices as stipulated in ProPECC Note 5/93 “Drainage Plan subject to Comment by the Environmental Protection Department”, ProPECC Note 1/94 “Construction Site Drainage” and Recommended Pollution Control Clauses for Construction Contracts shall be adopted to handle the construction site discharges.

Where dewatering is needed during excavation, the groundwater should be recharged below the water table outside the diaphragm wall (or temporary walls). Groundwater level should be monitored at the recharge point. Petrol interceptor should be installed to remove the free product.

The detailed design of a petrol interceptor should refer to ProPECC PN 1/94 “Construction Site Drainage”. The petrol interceptor should be inspected daily to determine if cleaning is required. If the oily waste or sludge is found to accumulate inside the interceptor (e.g. the contents show the top 30% of liquid depth occupied), it should be reported to the engineer-in-charge. The oily waste or sludge should be removed under supervision. The sludge collected in the petrol

interceptor should be containerised properly and collected by a licensed chemical waste collector to a licensed chemical waste treatment facility (e.g. the Chemical Waste Treatment Centre (CWTC) at Tsing Yi) for disposal. A record of cleaning and disposal of sludge should be kept.

#### 6.4.6 *Waste management*

The Contractor shall be responsible for controlling wastes within the construction site, removing waste materials, and implementing mitigation measures to minimise waste or redressing problems arising by wastes. The waste materials may include any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material flowing from the site onto any adjoining land, storm sewer, sanitary sewer, or any waste matter or refuse to be deposited anywhere within the site or onto any adjoining land, as well as public fill generated as part of site formation activities.

The Contractor shall also pay attention to the Waste Disposal Ordinance, the Dumping at Sea Ordinance, the Public Health and Municipal Services Ordinance and the Water Pollution Control Ordinance, and carry out the appropriate waste management work. The relevant licence/permit, such as the effluent discharge licence, the chemical waste producer registration, etc shall be obtained. The Contractor shall refer to the relevant booklets issued by EPD when applying for the licence / permit.

During the site inspections and the document review procedures, the ET Leader shall pay special attention to the issues relating to waste management, and check whether the Contractor has followed the relevant Contract Specifications and the procedures specified under the laws of Hong Kong.

Mitigation measures have been proposed in the EIA to minimise the generation of various wastes and associated environmental impacts. The key measures are summarised below:

- Ensure proper implementation of a trip ticket system;
- Reuse excavated fill material for backfilling and reinstatement;
- For the tunnel section to the north of WKN, stockpile excavated C&D material adjacent to its source for immediate backfill once the tunnel section is completed;
- Carry out on-site sorting;
- Surplus artificial hard materials should be delivered to Tuen Mun Area 38 recycling plant for recycling into subsequent useful products;
- Use the existing bituminous pavement for paving of construction access and temporary holding / parking areas;
- Use standard formwork as far as practicable to minimise the arising of C&D materials;
- Use metal hoarding to enhance the possibility of being recycled;
- Consider alternatives that generate reduced quantities or even no chemical waste, or less dangerous types of chemical waste;
- Handle chemical waste in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes;
- Provide adequate numbers of portable toilets for the workers and maintain the toilet in a clean state;

- Ensure all general refuse is stored in enclosed bins or compaction units and provide waste separation facilities for paper, aluminium cans, plastic bottles etc.

#### 6.4.7 Land Contamination

A land contamination assessment has been conducted and historical information such as site geological information, ground condition, aerial photos have been reviewed. It has been concluded that approximately 39m<sup>3</sup> of soil near the ex-government dockyard at Canton Road Government was contaminated and hence need to be properly disposed. **Figure 6-1** shows the location of this hot spot.

The soil excavation and disposal methodology and the requirements for compliance testing for contaminated soil are given below.

##### 6.4.7.1 Excavation and Disposal Methodology

The Remediation Assessment Plan (RAP) has been prepared and submitted to EPD for approval. During excavation of the contaminated soil, the procedure provided in the RAP shall strictly be followed.

The remediation area for contaminated soil shall be clearly marked out on site and excavated to an extent of 3.5m radius from the sample location. Excavation shall be undertaken by dedicated earth-moving plant.

The overlaying uncontaminated material shall be removed and stockpiled adjacent to the excavation until the specified depth is reached. The excavated contaminated soils should not be stockpiled on site, but should immediately be loaded onto trucks and taken to the chosen landfill site. All trucks carrying contaminated material should be adequately covered by sheets to prevent dispersion of contamination.

The remediation Contractor shall have a valid discharge licence from EPD where applicable and should carry out the remediation works in accordance with all relevant legislative requirements and EPD's Guidance Note.

The remediation programme shall be supervised by the on-site Geotechnical Engineer (to be appointed by the Contractor) with at least 7 years experience in contamination assessment or decontamination. All relevant method statements prepared by the remediation Contractor should be reviewed and approved by the Decontamination Specialist before proceeding with the works.

##### 6.4.7.2 Compliance Testing

Following completion of excavation to the specified depth, at least one sample from the base of the excavation and three samples evenly distributed along the boundary of the excavation shall be taken for carrying out the compliance testing. The compliance testing requirements are shown in Table 6-1.

Table 6-1: Requirements for compliance testing

Locations	Testing Requirement	Acceptance Criteria
KSD100/DH063	Lead	Dutch B Level

If the analysis indicates continued presence of contamination, the excavation shall be extended a further 1m depth or wide with material disposed of as described above, and a further sample taken for compliance testing. The process of excavation, sampling and compliance testing should

continue until all contaminated material is removed. The excavated hole shall then be backfilled by using suitable clean fill material.

#### 6.4.7.3 Protective and Safety Measures

The contaminants present on the site are at relatively low levels, and are not expected to pose serious acute health risk to the site workforce. However, it is good practice to ensure that remediation workers are adequately protected to ensure that there are no significant residual risks. The health and safety precautions shall be followed:

- Personal Protective Equipment (PPE) such as safety hat, chemical protective gloves, masks eye goggles, protective clothing (upgraded if contact with contaminated material cannot be avoided) and protective footwear etc. must be provided to staff, which would be involved in the remediation work. No works should be allowed without the suitable PPE.
- Workers should inspect and check their PPE before, during and after use. In cases where any of the PPE is broken, the worker shall stop work immediately and inform the on-site registered safety officer. The worker is not allowed to re-start his work until the broken PPE is replaced.
- Hand washing basins or other washing facilities shall be provided in areas easily accessible to all workers.
- Workers shall always maintain basic hygiene standard (e.g. hand wash before leaving the contaminated work zone). Workers shall also be responsible for cleaning and storing their own PPE in a secure place before leaving the site.
- Eating, drinking and smoking must be strictly prohibited within the site areas.
- It should be noted that these precautions are additional to any other health and safety requirements that will apply on the site such as those requiring protective footwear and headgear.

#### 6.4.8 *Landscape and Visual*

A number of mitigation measures have been identified in the EIA to minimise the landscape and visual impacts during the construction phase and operational phase as detailed in the EMIS. The effectiveness of the Contractor's implementation and maintenance of these mitigation measures will be monitored as part of the ongoing site audit programme.

##### 6.4.8.1 Landscape

- To retain and protect existing trees within Contractor's temporary works areas;
- To ensure that trees to be maintained are not damaged during the construction work;
- To ensure that tree transplanting is conducted efficiently without reducing the survival potential of the transplanted tree;
- To incorporate all compensatory trees as in the EIA Report;
- To protect Champion trees at all times;
- To ensure that landscape restoration works commence at the earliest opportunity to minimise the visual impact of the works;

- To monitor planting, if applicable, to ensure correct species and correct spacing etc. to ensure maximum possible survival rates are achieved;
- To monitor the number of planted trees to ensure that tree loss is adequately compensated for in terms of their numbers;
- To take photographic records of all retained trees before construction;
- To provide a Tree Protection Specification and a Tree Transplanting Specification in Contract Specification;
- To submit a detailed Construction Method Statement, under the detailed Tree Protection Specification, for trees protection by Contractor; and
- To ensure the provision of an attractive public streetscape area in front of West Kowloon Station (at least 400sq.m.), with shade trees in paving and adequate seating facilities, as partial mitigation for the permanent alienation of public open space at corner of Canton Road and Kowloon Park Drive.

#### 6.4.8.2 Visual

- To ensure that site hoardings are positioned correctly to provide visual screening of the works from key sensitive receivers; and
- To ensure that the recommendations of the EIA for hoarding arrangement, colours, design and heights are implemented efficiently on-site and are maintained in a clean and tidy state during construction.

#### 6.4.9 Cultural heritage

The ET Leader shall conduct structural monitoring during the construction of the mined tunnel underneath the FMPHQ to ensure compliance with the Buildings Ordinance. He shall prepare and submit a monitoring methodology for submission to the relevant government departments (e.g. BD, AMO) for agreement / approval.

In addition, before the commencement of the construction work, the Contractor shall also consult AMO on any other mitigation measures that would be required administratively or under the Antiquities and Monuments Ordinance. The Contractor shall implement these requirements from AMO during the construction period.

## 7. REPORTING

### 7.1 General

The following reporting requirements based upon a paper documented approach. However, the same information can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper/historic and reactive approach to an electronic/real time proactive approach.

### 7.2 Baseline Monitoring Report

The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report, endorsed by IEC, within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to each of the four parties: the Contractor,

IEC, ER and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies required. The format of the report and the format of the baseline monitoring data in magnetic media to be submitted to EPD shall be agreed with EPD.

The baseline monitoring report shall include at least the following:

- up to half a page executive summary;
- brief project background information;
- drawings showing locations of the baseline monitoring stations;
- monitoring results (in both hard and diskette copies) together with the following information:
  - monitoring methodology
  - equipment used and calibration details
  - parameters monitored
  - monitoring locations (and depth)
  - monitoring date, time, frequency and duration;
- details on influencing factors, including:
  - major activities, if any, being carried out on the site during the period
  - weather conditions during the period
  - other factors which might affect the results;
- determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data;
- revisions for inclusion in the EM&A Manual; and
- comments and conclusions.

### 7.3 Monthly EM&A Reports

The results and findings of all EM&A works required in this Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader and endorsed by IEC. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due in the month after construction commences. Copies of each monthly EM&A report shall be submitted to each of the four parties: the Contractor, ER, IEC and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium requirement.

The ET leader shall review the number and location of monitoring stations and monitoring parameters every 6 months or on as needed basis in order to cater for the changes in surrounding environment and nature of works in progress.

#### 7.3.1 *First Monthly EM&A Report*

The first monthly EM&A report shall include at least the following :

- 1-2 pages executive summary;



- 
- basic project information including a synopsis of the project organisation, programme and management structure, and the work undertaken during the month;
  - a brief summary of EM&A requirements including:
    - all monitoring parameters
    - environmental quality performance limits (Action and Limit levels)
    - Event-Action Plans
    - environmental mitigation measures, as recommended in the EIA report
    - environmental requirements in Contract documents;
  - advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the EIA report and implementation schedule;
  - drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
  - monitoring results (in both hard and diskette copies) together with the following information:
    - monitoring methodology
    - equipment used and calibration details
    - parameters monitored
    - monitoring locations (and depth)
    - monitoring date, time, frequency, and duration;
  - graphical plots of trends of monitored parameters over the past four scheduled audits for representative monitoring stations annotated against the following:
    - major activities being carried out on site during the period
    - weather conditions during the period
    - any other factors which might affect the monitoring results;
  - advice on the solid and liquid waste management status;
  - a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
  - a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
  - a description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance;
  - a summary record of all complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints; and
  - An account of the future key issues as reviewed from the works programme and work method statements.

### 7.3.2 *Subsequent EM&A Reports*

The subsequent monthly EM&A reports shall include the following :

- Title Page;
- Executive Summary (1-2 pages)
  - Breaches of AL levels
  - Complaint Log
  - Reporting Changes
  - Future key issues;
- Contents Page;
- Environmental Status
  - Drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations
  - Summary of non-compliance with the environmental quality performance limits
  - Summary of complaints;
- Environmental Issues and Actions
  - Review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies)
  - Description of the actions taken in the event of non-compliance and deficiency reporting
  - Recommendations (should be specific and target the appropriate party for action)
  - Implementation status of the mitigation measures and the corresponding effectiveness of the measures;
- Future Key Issues; and
- Appendix
  - AL levels
  - Graphical plots of trends of monitored parameters at key stations over the past four scheduled audits for representative monitoring stations annotated against the following:
    - i) major activities being carried out on site during the period
    - ii) weather conditions during the period
    - iii) any other factors which might affect the monitoring results
  - Monitoring schedule for the present and next reporting period
  - Cumulative complaints statistics
  - Details of complaints, outstanding issues and deficiencies.

### 7.3.3 Final EM&A Review Reports

The Final EM&A Report shall contain at least the following information:

- Executive Summary (1-2 pages);
- drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- basic project information including a synopsis of the project organization contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
- a brief summary of EM&A requirements including:
  - (i) environmental mitigation measures, as recommended in the EIA Report;
  - (ii) environmental impact hypotheses tested;
  - (iii) AL Levels;
  - (iv) all monitoring parameters
  - (v) Event-Action Plans;
- a summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA report summarized in the updated implementation schedule;
- graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project, including the post project monitoring (for the past twelve months for annual report) for all monitoring stations against:
  - i) the major activities being carried out on site during the period;
  - ii) weather conditions during the period; and
  - iii) any other factors which might affect the monitoring results
- a summary of non-compliance (exceedances) of the environmental quality performance limits (AL Levels);
- a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
- a description of the actions taken in the event of non-compliance;
- a summary record of all complaints received (written or verbal) for each media liaison and consultation undertaken, action and follow-up procedures taken;
- a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations including locations and nature of the breaches, investigation, follow-up actions taken and results;
- a review of the validity of EIA Report predictions and identification of shortcomings in EIA Report recommendations; and
- a review of the effectiveness and efficiency of the mitigation measures; and
- a review of success of the EM&A programme to cost effectively identify deterioration and to initiate prompt effective mitigation action when necessary.

#### 7.4 Data Keeping

The site documents such as the monitoring field records, laboratory analysis records, site inspection forms, etc. are not required to be included in the monthly EM&A reports for submission. However, the documents shall be well kept by the ET Leader and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the documents. The monitoring data shall also be recorded in magnetic media form. All the documents and data shall be kept for at least one year after completion of the construction Contract.

#### 7.5 Interim Notification of Environmental Quality Limit Exceedances

With reference to Event/Action Plans, when the environmental quality limits are exceeded, the ET Leader shall immediately notify ER, IEC and EPD, as appropriate. The notification shall be followed up to advise EPD and IEC on the results of the investigation, proposed action and any necessary follow-up proposals in case of exceedance. A sample template for the interim notifications is shown in **Appendix 7-1**.

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