

TERRITORY DEVELOPMENT
DEPARTMENT, HONG KONG

QUALITY ASSURANCE
POLICY STATEMENT

KAI TAK AIRPORT NORTH APRON
DECOMMISSIONING

ENVIRONMENTAL MONITORING &
AUDIT MANUAL
(AMENDED VERSION)

JUNE 1998

MAUNSELL CONSULTANTS ASIA LTD
in association with
CES (ASIA) LTD


QUALITY ASSURANCE POLICY STATEMENT

CES (Asia) Ltd is committed to provide to our clients the most responsive and professional environmental consulting services in Asia.

It is the Company's objective to provide services which meet the required specification and are produced on time in a cost-effective manner.

In pursuit of these objectives, the Directors have implemented Quality Systems which have achieved Third Party Certification to BS EN ISO 9001:1994 Standard. All employees of the Company have a responsibility for quality.

The quality procedures are under continual review by Senior Management to ensure that the changing needs of the Company's Clients are met.

REPORT NO.	1401
STATUS	Final
DATE OF ISSUE	24 June 1998
APPROVED BY	
	(Director)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing. Where information has been supplied by third parties, such information is reproduced here in good faith and CES (Asia) Ltd accepts no responsibility for the accuracy of the supplied information.

CES (Asia) Ltd accepts no responsibility for changes made to this report by third parties.

This report follows MCAL's format.

TABLE OF CONTENTS

	Page
1 INTRODUCTION	1
1.1 Purpose of the Manual	1
1.2 Background	2
1.3 Environmental Monitoring and Audit Requirements	3
1.4 Project Organization	4
1.5 Construction Programme	5
2 AIR QUALITY	6
2.1 Air Quality Parameters	6
2.2 Monitoring Equipment	6
2.3 Laboratory Measurement / Analysis	8
2.4 Monitoring Locations	8
2.5 Baseline Monitoring	9
2.6 Impact Monitoring	10
2.7 Event and Action Plan for Air Quality	10
2.8 Mitigation Measures	13
3 NOISE	15
3.1 Noise Parameters	15
3.2 Monitoring Equipment	15
3.3 Monitoring Locations	15
3.4 Baseline Monitoring	16
3.5 Impact Monitoring	16
3.6 Event and Action Plan for Noise	17
3.7 Noise Mitigation Measures	17
4 WATER QUALITY	20
4.1 Water Quality Parameters	20
4.2 Monitoring Equipment	20
4.3 Laboratory Measurement / Analysis	21
4.4 Monitoring Locations	22
4.5 Impact Monitoring	22
4.6 Event and Action Plan for Water Quality	22
4.7 Water Quality Mitigation Measures	25
5 LAND CONTAMINATION	27
5.1 Land Contamination Parameters	27
5.2 Monitoring Equipment	27
5.3 Laboratory Measurement / Analysis	28
5.4 Monitoring Locations	28
5.5 Site Closure Assessment	29
5.6 Post Remediation Monitoring	29
5.7 Event and Action Plan for Land Contamination	30
5.8 Mitigation Measures	30
6 WASTE MANAGEMENT	33

7	SITE ENVIRONMENTAL AUDIT	34
7.1	Site Inspections	34
7.2	Compliance with Legal and Contractual Requirements	35
7.3	Environmental Complaints	35
8	REPORTING	37
8.1	General	37
8.2	Baseline Monitoring Report	37
8.3	EM&A Reports	37
8.4	Quarterly EM&A Summary Reports	41
8.5	Final EM&A Review Report	42
8.6	Data Keeping	44
8.7	Interim Notifications of Environmental Quality Limit Exceedances	44

List of Tables

Table 2.1	Action and Limit Levels for Air Quality	10
Table 2.2	Event/Action Plan for Air Quality	11
Table 3.1	Action and Limit Levels for Construction Noise	17
Table 3.2	Event/Action Plan for Construction Noise	19
Table 4.1	Water Sample Handling Requirements	21
Table 4.2	Selection of Effluent Standards Discharged into Coastal Waters of Victoria Harbour Water Control Zone	22
Table 4.3	Event and Action Plan for Water Quality	24
Table 5.1	Methods Employed for Soil Samples Analysis	28
Table 5.2	Methods Employed for Groundwater Analysis	28
Table 5.3	Remediation Target	29
Table 5.4	Event and Action Plan for Land Contamination	32

List of Figures

Figure 1.1	Study Area
Figure 1.2	Project Organisation
Figure 1.3	Environmental Communication and Responsibilities
Figure 3.1	Representative Construction Noise Sensitive Receivers

Appendices

Appendix A	Environmental Monitoring Data Recording Sheets
Appendix B	Mitigation Measures Implementation Schedules
Appendix C	Environmental Proformas
Appendix D	Interim Notification of Environmental Quality Limit Exceedances

1 INTRODUCTION

1.1 Purpose of the Manual

Based on para 4.2 of EIA Guidelines

The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the setup of an EM&A programme to ensure compliance with the Environmental Impact Assessment (EIA) study recommendations, to assess the effectiveness of the recommended mitigation measures and to identify any further need for additional mitigation measures or remedial action. This Manual outlines the monitoring and audit programme to be undertaken for the “Kai Tak Airport North Apron Decommissioning”. It aims to provide systematic procedures for monitoring, auditing and minimising the environmental impacts associated with the construction works.

Hong Kong environmental regulations for air and water quality, noise and waste, the Hong Kong Planning Standards and Guidelines, and recommendations in the EIA report on the “Kai Tak Airport North Apron Decommissioning” have served as environmental standards and guidelines in the preparation of this Manual.

This Manual contains the following :

- (a) responsibilities of the Contractor, the Engineer or the Engineer’s Representative (ER), Environmental Team (ET), and the Independent Checker (Environment) (IC(E)) with respect to the environmental monitoring and audit requirements during the course of the project
- (b) information on project organisation and programming of construction activities for the project
- (c) the hypotheses of potential impacts, the basis for, and description of the broad approach underlying the environmental monitoring and audit programme
- (d) requirements with respect to the construction schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact
- (e) the specific questions and testable hypotheses that the monitoring programme is designed to answer
- (f) full details of the methodologies to be adopted, including all field, laboratory and analytical procedures, and details on quality assurance and quality control programme
- (g) the rationale on which the environmental monitoring data will be evaluated and interpreted and the details of the statistical procedures that will be used to interpret the data
- (h) definition of Action and Limit levels

- (i) establishment of Event and Action Plans
- (j) requirements of reviewing pollution sources and working procedures required in the event of non-compliance of the environmental criteria and complaints
- (k) requirements of presentation of environmental monitoring and appropriate reporting procedures
- (l) requirements for review of EIA predictions and effectiveness of the environmental monitoring and audit programme.

For the purpose of this manual, the "Architect/Engineer" shall refer to the Architect/Engineer as defined in the Contract and the Architect/Engineer's Representative (A/ER), in cases where the Architect/Engineer's powers have been delegated to the A/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 with the role of executing the environmental monitoring and audit requirements.

1.2 Background

1.2.1 The Proposed Project

The relocation of the Kai Tak Airport (KTA) to the new airport at Chek Lap Kok in July 1998 provides an opportunity to develop the existing airport site to meet Hong Kong's urgent need for more housing and infrastructure.

Following the endorsement of the South East Kowloon Development Statement (SEKDS) by the Land Development Policy Committee in November 1993, the South East Kowloon Development Feasibility Study (SEKDFS) commenced in September 1995. The study aims to establish the engineering feasibility of the development of South East Kowloon and reprovisioning of affected marine facilities. A draft Outline Master Development Plan (OMDP) was produced in the Study A of this feasibility study and was endorsed by the Committee on Planning and Land Development (CPLD) in November 1997.

The SEKDS identifies a number of Early Development Packages (EDPs), including the Kai Tak Airport - Early Development Package (KTA - EDP) for further study in the SEKDFS to enable their early implementation to meet various land use demands, in particular for public and private housing.

The draft OMDP produced in the SEKDFS indicates that the north apron of Kai Tak Airport (NAKTA) will be primarily developed for housing and housing related uses. To meet the housing development programme at KTA, the KTA - EDP will comprise necessary site preparation and infrastructure works to permit early occupation of the housing sites.

As part of the environmental study in the SEKDFS, an initial assessment was made to determine the nature and extent of possible ground contamination at the KTA apron area resulting from

historical leaks of aviation fuels and from other sources. From the field data acquired from the initial assessment, contamination is more pronounced in the vicinity of the HAECO and Oil Companies Tank Farm (OCTF) sites and the hydrant fuel system.

In order to meet the housing development programme and enable development of the housing sites and construction works to proceed, there is an urgent need to implement appropriate remediation measures to clean up the affected areas immediately after the airport closes.

To facilitate follow-on building construction, Housing Development also requested the breaking up and removal of existing apron slab within the sites to be handed over to them for development.

The primary objectives of the Kai Tak Airport North Apron decommissioning are:

- To clean-up the contaminated areas at the NAKTA. Thus the site will be safe and free of hazards for the planned uses, either temporary or permanent, and during construction.
- To undertake demolition of existing buildings, underground structures, services and removal of ground slabs and site preparation for the apron site. Thus the site will be ready for the subsequent housing developments.

1.2.2 EIA Study

The purpose of this EIA Study is to provide information on the nature and extent of environmental impacts arising from the decommissioning of the NAKTA and all related activities taking place concurrently, including the demolition, decontamination and removal of pavement. The project site and boundary are shown in Figure 1.1.

Environmental issues that have been addressed in the EIA include noise, air quality, water quality, construction and demolition waste, ecology and land contamination.

Sensitive receivers for noise and air quality include the residents in Kowloon Bay, San Po Kong, Kowloon City and To Kwan Wan. For water quality, the sensitive receivers consist of the main water receiving bodies including KTN, Kai Tak Approach Channel and Kowloon Bay.

As the project is not expected to cause migration of land contaminant off-site (hence environmental impact), the monitoring of the land contamination within the site is viewed as a parameter showing the decontamination progress. It will not be included in the EM&A.

1.3 Environmental Monitoring and Audit Requirements

The EM&A programme for this study, as identified in the EIA, involves baseline, impact and compliance monitoring in the areas of:

- noise
- air quality (dust and benzene)

- surface water quality
- *land contamination.*

The environmental monitoring and audit requirements recommended in the EIA are detailed in the relevant sections of this report.

1.4 Project Organization

The project organisation, consisting of Contractor, ER, IC(E) and ET, is shown in Figure 1.2. The responsibility of respective parties are:

- The Contractor
 - employ an Environmental Team (ET) to undertake monitoring, laboratory analysis and reporting of environmental monitoring and audit
 - provide assistance to ET in carrying out monitoring
 - submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event and Action Plans
 - implement measures to reduce impact where Action and Limit levels are exceeded
 - adhere to the procedures for carrying out complaint investigation in accordance with 6.3.
- The Engineer or Engineer's Representative:
 - supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with
 - inform the Contractor when action is required to reduce impacts in accordance with the Event and Action Plans
 - employ an Independent Checker (Environment)(IC(E)) to audit the results of the EM&A works carried out by the ET
 - adhere to the procedures for carrying out complaint investigation in accordance with 6.3.
- The Environmental Team: *- different for phases in 2006*
 - monitor the various environmental parameters as required in the EM&A Manual
 - analyse the environmental monitoring and audit data and review the success of EM&A programme to cost effectively confirm the adequacy of mitigatory measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising
 - carry out site inspection to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and anticipate environmental issues for proactive action before problems arise
 - audit and prepare audit reports on the environmental monitoring data and the site

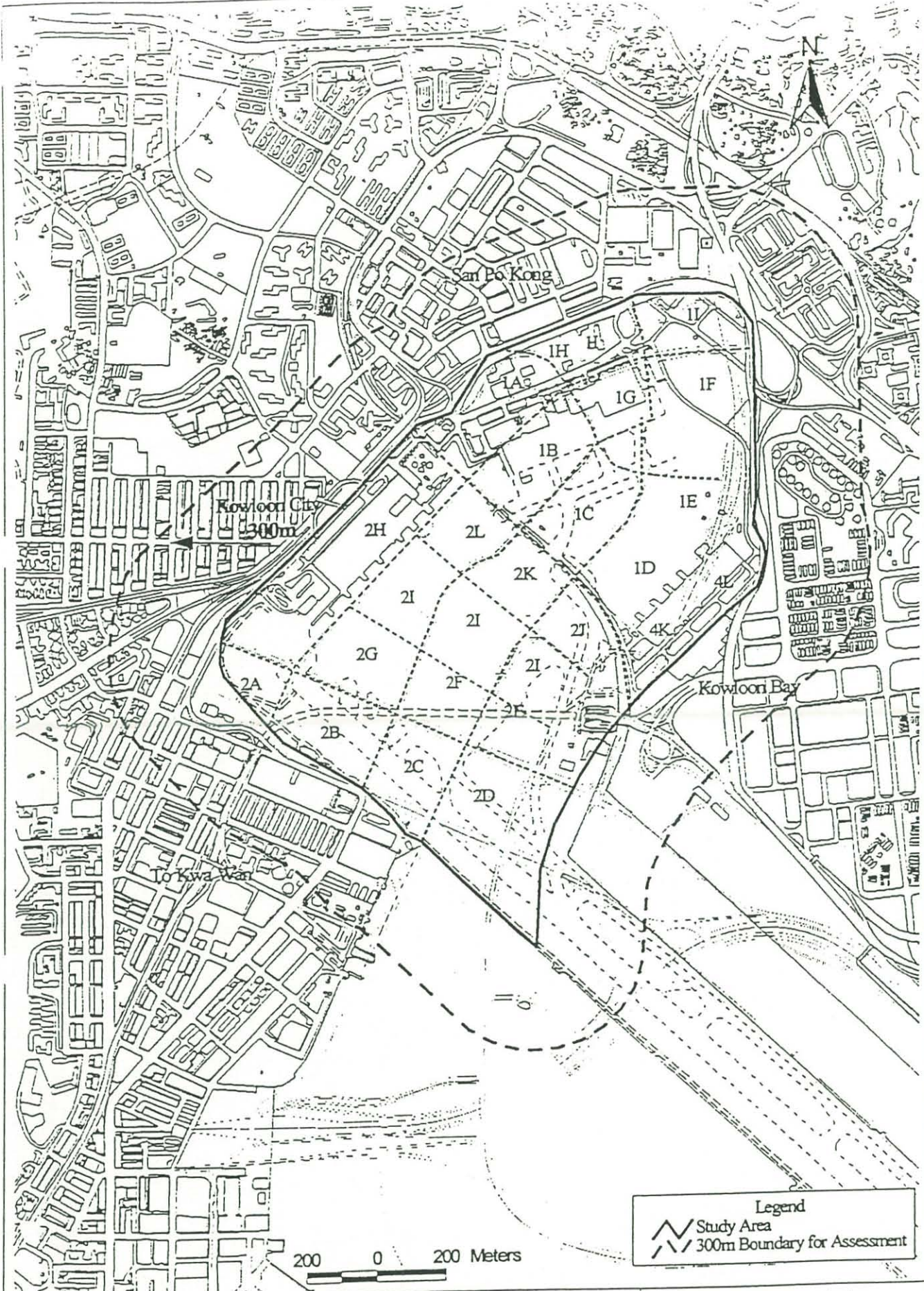
- environmental conditions
 - report on the environmental monitoring and audit results to the IC(E), Contractor, the ER, and the EPD
 - recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans
 - adhere to the procedures for carrying out complaint investigation in accordance with 6.3.
- Independent Checker (Environment) - *different from para 4.6 EPD guidelines*
 - review the EM&A works performed by the ET
 - audit the monitoring activities and results
 - evaluate the EM&A reports submitted by the ET
 - review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans
 - adhere to the procedures for carrying out complaint investigation in accordance with 6.3.

Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibility, as required under the EM&A programme for the duration of the project. The ET shall not be in any way an associated body of the Contractor. The ET leader shall have relevant professional qualifications, or have sufficient relevant EM&A experience subject to approval of the ER and the Environmental Protection Department (EPD).

The lines of communication of each party and responsibilities of ET and IC(E) with respect to environmental protection works is shown in Figure 1.3.

1.5 Construction Programme

In accordance with the programme, all decontamination and most of the demolition and removal of pavement work will be complete by 2000. However, the Contractor shall provide the finalised programme to the ET prior to the commencement of any work. The ET Leader shall make reference to the actual works progress and programme during the construction stage to schedule the EM&A works, and the Contractor shall provide the respective information to the ET Leader for formulating the EM&A schedule.



Legend
 Study Area
 300m Boundary for Assessment

200 0 200 Meters

Maunsell
 環 C
 科 E
 科 S

KAI TAK AIRPORT NORTH APRON DECOMMISSIONING

TITLE
 Study Area

Territory Development Department, Hong Kong
 Kowloon Development Office

SCALE	1:15000	DATE	March 1998
DESIGNED	Fanny Lau	DRAWN	Fanny Lau
CAO REF	C415	DRAWING NO.	Figure 1.1
		REV	0

Client
Territory Development Department

Engineer/Engineer's Representative
(ER)

Independent Checker (Environment)
(IC(E))

Contractor

Environmental Team Leader
(ET Leader)

Environmental Team
(ET)

Figure 1.2 Project Organisation

*Based on Fig 4.1
in OPD Guideline*

Project Proponent

Engineer/Engineer's Representative

Contractor

Independent Checker (Environment)

Environmental Team

- Review monitoring activities
- Validate accuracy of monitoring equipment, monitoring location, monitoring results, location of sensitive receivers
- Sample check on monitoring data
- Site inspection
- Audit construction methodology
- Advise on proactive action
- Review accuracy of Environmental Monitoring
- Endorse EM&A report by ET
- Check on complaint cases & effectiveness of corrective measures

- + Implementation Status Proforma on Mitigation action
 - + Proactive Environmental Protection Proforma for construction method alternatives
 - + Regulatory Compliance Proforma Listing Licenses/Permits compliance
 - + Site Inspection Proforma
 - + Complaint report
 - + EM&A report for endorsement
 - + Effectiveness of EIA recommendations
- ↻
- + Advise on Environmental Performance
 - + Return/sign off audit Proformas
 - + Environmental concerns recommendations on construction methods

Advise on environmental performance

Advise on environmental performance/action for improvement

Communication :
for environmental protection



TITLE
Environmental Communication and Responsibilities

CES (Asia) LIMITED			
PROJECT NO	C415	DATE	April 98
DESIGNED	wtao	DRAWING NO	Figure 1.3

2 AIR QUALITY

2.1 Air Quality Parameters

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

1-hour and 24-hour TSP levels shall be measured to indicate the impacts of construction dust on air quality. The TSP levels shall be measured by following the standard high volume sampling method as set out in the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B. Upon approval of 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.

Benzene should be measured to indicate the impact of decontamination process on air quality.

In addition, 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 any other local atmospheric factors affecting or affected by site conditions etc. shall be recorded in detail. A sample data sheet is shown in Appendix A1.

2.2 Monitoring Equipment

The ET Leader is responsible for provision of the following monitoring equipment.

2.2.1 TSP

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

- (a) 0.6-1.7 m³/min (20-60 SCFM) adjustable flow range
- (b) equipped with a timing/control device with +/- 5 minutes accuracy for 24 hours operation
- (c) installed with elapsed-time meter with +/- 2 minutes accuracy for 24 hours operation
- (d) capable of providing a minimum exposed area of 406 cm² (63 in²)
- (e) flow control accuracy: +/- 2.5% deviation over 1-hour sampling period
- (f) equipped with a shelter to protect the filter and sampler
- (g) incorporated with an electronic mass flow rate controller or other equivalent devices
- (h) equipped with a flow recorder for continuous monitoring
- (i) provided with a peaked roof inlet
- (j) incorporated with a manometer
- (k) able to hold and seal the filter paper to the sampler housing at horizontal position
- (l) easy to change the filter
- (m) capable of operating continuously for 1-hour period.

The ET Leader 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.

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 by the concerned parties such as the IC(E). All the data should 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 in the data sheet as presented in Appendix A1.1

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

Wind 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 in consultation with the IC(E). For installation and operation of wind data monitoring equipment, the following points shall be observed:

- (a) the wind sensors should be installed 10m above ground so that they are clear of obstructions or turbulence caused by the buildings
- (b) the wind data should be captured by a data logger. The data shall be downloaded for analysis at least once a month
- (c) the wind data monitoring equipment should be re-calibrated at least once every six months
- (d) wind direction should 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 and agreement from the IC(E).

2.2.2 Benzene

Canisters with on/off valve, flow controller/flow meter, pressure/ vacuum gauge should be used for the monitoring of benzene. The canisters shall be pre-cleaned by pressure- vacuum cycles and properly checked for contamination and leakage. The method should be in accordance with USEPA TO - 14 method. The data sheet for TO-14 Canister Sampling is presented in Appendix A1.2.

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

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 in consultation with IC(E). Any measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IC(E). IC(E) shall regularly audit the measurement performed by the laboratory to ensure the accuracy of measurement results.

Filter paper of size 8"x10" shall be labelled before sampling. It shall be a clean filter paper with no pin holes, and shall be conditioned in a humidity controlled chamber for over 1-hour 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.

The analysis of benzene should be in accordance with USEPA TO-14 method. The laboratory steps consist of sample introduction, sample conditioning, sample concentration (cryogenic preconcentration), sample focussing, gas chromatography and detection. A QA/QC programme, consists of blank analysis, duplicate and daily calibration should be followed.

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

2.4 Monitoring Locations

The dust monitoring stations should be set up at the site boundary in close proximity to the sensitive receivers in To Kwa Wan, Kowloon City, San Po Kong and Kowloon Bay. The benzene monitoring should be carried out at the sensitive receiver closest to the OCTF site. The ET Leader shall propose final monitoring locations and seek approval from ER and agreement from the IC(E).

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

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

2.5 Baseline Monitoring

The ET Leader shall carry out baseline monitoring at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works to obtain daily 24-hour TSP samples, 1-hour TSP and benzene. 1-hour sampling shall also be done at least 3 times per day while the highest dust impact is expected. Before commencing the baseline monitoring the ET leader shall inform the IC(E) of the baseline monitoring programme such that the IC(E) can conduct on-site audit to ensure accuracy of the baseline monitoring results.

During the baseline monitoring, there should not be any construction or dust generation activities in the vicinity of the monitoring stations.

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

In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with the IC(E) 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 three monthly intervals. If the ET Leader considers that the ambient conditions have changed and a repeat of the baseline monitoring is required to be carried out for obtaining the updated baseline levels, the monitoring should be 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 the IC(E) and EPD.

2.6 Impact Monitoring

The ET Leader shall carry out impact monitoring during the course of the Works. For regular impact monitoring, the sampling frequency of at least once in every six-days, shall be strictly observed at all the monitoring stations for 24-hour TSP monitoring. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs. For benzene monitoring, the sampling frequency of at least once per month should be undertaken. Before commencing the baseline monitoring, the ET leader shall inform the IC(E) of the impact monitoring programme such that the IC(E) can conduct on-site audit to ensure accuracy of the impact monitoring results.

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

In case of non-compliance with the air quality criteria, more frequent monitoring, as specified in the Action Plan in Section 2.7, shall be conducted within 24 hours after the result is obtained. This additional monitoring shall be continued until the excessive deterioration in air quality is rectified.

2.7 Event and Action Plan for Air Quality

The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET Leader shall compare the impact monitoring results with air quality criteria set up for 24-hour TSP and 1-hour TSP. Table 2.1 shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occur, actions in accordance with the Action Plan in Table 2.2 shall be carried out.

Table 2.1 Action and Limit Levels for Air Quality

Parameters	Action	Limit
Benzene in $\mu\text{g}/\text{m}^3$	APCO - TM Health Protection Concentration Limit	185
24 Hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level < 108 $\mu\text{g}/\text{m}^3$, Action level = average of baseline level plus 30% and Limit level For baseline level > 108 $\mu\text{g}/\text{m}^3$ and baseline level < 154 $\mu\text{g}/\text{m}^3$, Action level = 200 $\mu\text{g}/\text{m}^3$ For baseline level > 154 $\mu\text{g}/\text{m}^3$, Action level = 130% of baseline level	260
1 Hour TSP Level in $\mu\text{g}/\text{m}^3$	For baseline level < 154 $\mu\text{g}/\text{m}^3$, Action level = average of baseline level plus 30% and Limit level For baseline level > 154 $\mu\text{g}/\text{m}^3$ and baseline level < 269 $\mu\text{g}/\text{m}^3$, Action level = 350 $\mu\text{g}/\text{m}^3$ For baseline level > 269 $\mu\text{g}/\text{m}^3$, Action level = 130% of baseline level	500

action levels different from Table 1.1 in App D2 in CPD

Table 2.2 Event/Action Plan for Air Quality

Event	ET	* Action		
		IC(E)	ER	Contractor
ACTION LEVEL				
1. Exceedance for one sample	<ul style="list-style-type: none"> Identify source Inform IC(E) and ER Repeat measurement to confirm finding Increase monitoring frequency to daily 	<ul style="list-style-type: none"> Check monitoring data submitted by ET Check Contractor's working method 	<ul style="list-style-type: none"> Notify Contractor 	<ul style="list-style-type: none"> Rectify any unacceptable practice Amend working methods if appropriate
2. Exceedance for two or more consecutive samples	<ul style="list-style-type: none"> Identify source Inform IC(E) and ER Repeat measurements to confirm findings Increase monitoring frequency to daily Discuss with IC(E) and Contractor on remedial actions required If exceedance continues, arrange meeting with IC(E) and ER If exceedance stops, cease additional monitoring 	<ul style="list-style-type: none"> Checking monitoring data submitted by ET Check Contractor's working method Discuss with ET and Contractor on possible remedial measures Advise the ER on the effectiveness of the proposed remedial measures Supervisor implementation of remedial measures 	<ul style="list-style-type: none"> Confirm receipt of notification of failure in writing Notify Contractor Ensure remedial measures properly implemented 	<ul style="list-style-type: none"> Submit proposals for remedial to IC(E) within 3 working days of notification Implement the agreed proposals Amend proposal if appropriate

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

2.8 Mitigation Measures

The EIA report has recommended air quality control and mitigation measures. The Contractor shall be responsible for the design and implementation of these measures.

- use of regular watering to reduce dust from exposed site surfaces, at least twice daily with complete coverage, particularly during dry weather
- use of frequent watering for particularly dusty static site areas close to the site boundary and sensitive receivers
- side enclosure and covering of any aggregate or dusty material storage piles to reduce emissions. Where this not practicable owing to frequent usage, watering should be employed to aggregate fines
- open stockpiles should be avoided or covered. Where possible, prevent placing dusty material storage piles near air quality sensitive receivers
- provision of barriers, which may be temporary noise barriers, between the site and nearby air quality sensitive receivers to act as dust barriers
- tarpaulin covering of all dusty vehicle loads transported to, from and between site locations
- establishment and use of vehicle wheel and body washing facilities at the exit points of the site, combined with cleaning of public roads where necessary
- provision of wind shield and dust extractor at the loading and unloading points and use of water sprinklers at the loading and unloading areas
- imposition of speed controls for vehicles on dusty site areas
- where feasible, routing of vehicles and positioning of plant at maximum possible separation distance from air quality sensitive receivers
- a crusher feedbox with a minimum number of openings should be installed for the crushing plant. Rubber curtains should be used to minimize dust escape and air flow
- the crusher should be choke fed to reduce air entrainment and dust emission
- a catalytic incinerator should be installed to exhaust fuel and oil vapour extracted from the contaminated site prior to their discharge to atmosphere
- *covering the biopile and venting the gas to a catalytic incinerator*

- *limiting the excavation rates to allow adequate vapour dispersion.*

Their implementation schedule is presented in Appendix B1.

If the above measures are not sufficient to restore the air quality to acceptable levels upon the advice of ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to ER for approval, and implement the mitigation measures.

3 NOISE

3.1 Noise Parameters

The construction noise level shall be measured in terms of the A-weighted equivalent continuous sound pressure level (Leq). Leq(30 min) shall be used as the monitoring parameter for the time period between 0700-1900 hours on normal weekdays. For all other time periods, Leq(5 min) shall be employed for comparison with the NCO criteria.

As supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. A data record sheet is shown in Appendix A2 for reference.

3.2 Monitoring Equipment

As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (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.

Noise measurements should not be made in the presence of fog, rain, wind with a steady speed exceeding 5ms^{-1} or wind with gusts exceeding 10ms^{-1} . The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

The ET Leader is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise measuring 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.

3.3 Monitoring Locations

In the EIA study, a large number of noise sensitive receivers have been identified around the project area in Kowloon City, Kowloon Bay and To Kwan Wan [Figure 3.1]. Thus, noise monitoring stations should be selected at least one in each of the four areas. The ET Leader shall propose updated monitoring locations and seek approval from ER and agreement from the IC(E) and EPD of the proposal. The selection of final monitoring locations should be based on the following criteria:

- (a) at locations close to the major site activities which are likely to have noise impacts
- (b) close to the noise sensitive receivers
- (c) for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal 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 correct of +3dB(A) shall be made to the free field measurements. The ET Leader shall agree with the IC(E) on the monitoring position 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.

3.4 Baseline Monitoring

The ET Leader shall carry out baseline noise monitoring prior to the commencement of the construction works. The baseline monitoring shall be carried out daily for a period of at least two weeks. A schedule on the baseline monitoring shall be submitted to the ER for approval before the monitoring starts.

There shall not be any construction activities in the vicinity of the stations during the baseline monitoring.

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

3.5 Impact Monitoring

Noise monitoring shall be carried out at all the designated monitoring station. The monitoring frequency shall depend on the scale of the construction activities. The following is an initial guide on the regular monitoring frequency for each station on a per week basis when noise generating activities are underway:

- (a) one set of measurements between 0700-1900 hours on normal weekdays
- (b) one set of measurements between 1900-2300 hours
- (c) one set of measurements between 2300-0700 hours of next day
- (d) one set of measurements between 0700-1900 hours on holidays (or Sunday).

The monitoring (b), (c) and/or (d) should be carried when work during these periods are taking place. For the measurement of (b), (c) and (d), one set of measurements shall at least include 3 consecutive Leq(5 min) results.

If a school exists near the construction activity, noise monitoring shall be carried out at the monitoring stations for the schools during the school examination periods. The ET Leader shall liaise with the school's personnel and the Examination Authority to ascertain the exact dates and times of all examination periods during the course of the contract.

In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in Section 3.6 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.

3.6 Event and Action Plan for Noise

The Action and Limit levels for construction noise are defined in Table 3.1. Should non-compliance of the criteria occurs, action in accordance with the Action Plan in Table 3.2, shall be carried out.

Table 3.1 Action and Limit Levels for Construction Noise

Time Period	Action	Limit
0700-1900 hrs on normal weekdays	When one documented complaint is received	75* dB(A)
0700-2300 hrs on holidays; and 1900-2300 hrs on all other days		70** dB(A)
2300-0700 hrs of next day		55** dB(A)

* reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.

** Based on Area Sensitivity Rating "C"

None as Table 3.1 is App 3.2 in 2000 Amendment

3.7 Noise Mitigation Measures

The EIA report has recommended construction noise control and mitigation measures. The Contractor shall be responsible for the design and implementation of these measures.

- Noisy equipment and activities should be sited by the contractor as far from sensitive receivers as is practical. Also, temporary site offices (and other similar structures) should be located, as far as is possible, such that sensitive receivers are screened from the line of sight of the construction areas.
- Intermittent noisy activities should be scheduled to minimize exposure of nearby NSRs to high levels of construction noise. For example, noisy activities can be scheduled at times coinciding with periods when dwellings are unoccupied. Prolonged operation of noisy equipment close to dwellings should be avoided.
- Idle equipment should be turned off or throttled down. Noisy equipment should be properly maintained and used no more often than is necessary.
- Construction activities should be planned so that parallel operation of several sets of equipment close to a given receiver is avoided.

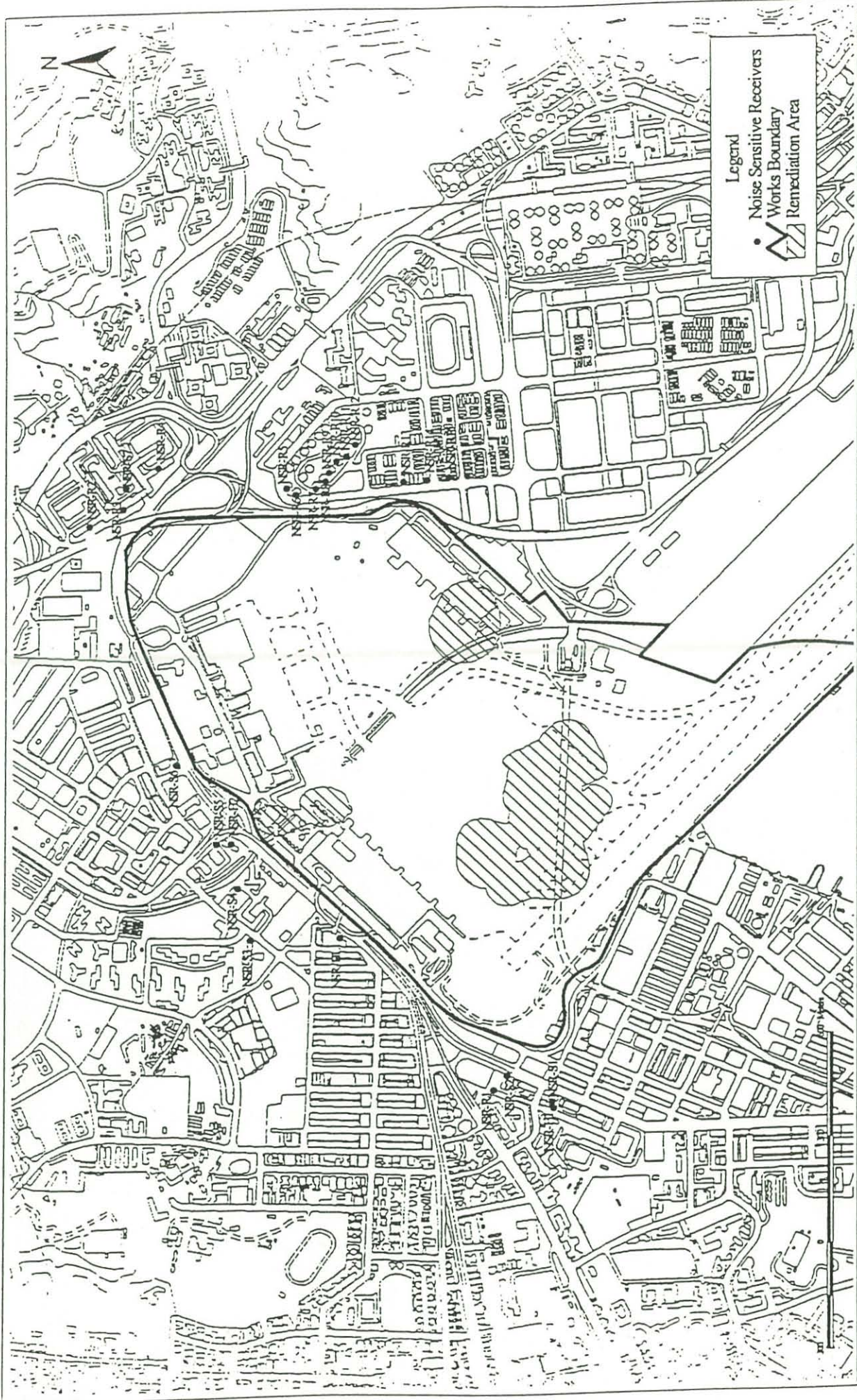
- Where possible, the numbers of concurrently operating items of plant should be reduced through sensitive programming
- *Use of quieter plant equipment*
- Construction plant should be properly maintained and operated. Construction equipment often has silencing measures built in or added on, e.g., compressor panels, and mufflers. Silencing measures should be properly maintained and utilized.

If the above measures are not sufficient to restore the construction noise quality to an acceptable levels upon the advice of ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to ER for approval, and carry out the mitigation measures.

Their implementation schedule is presented in Appendix B2.

Table 3.2 Event/Action Plan for Construction Noise

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



Territory Development Department, Hong Kong Kowloon Development Office	
SCALE	1 : 10000
DATE	Apr. 1998
DRAWN	Jim Shorthose
DESIGNED	Fanny Lau
CAD REF	C415
CREATING	Figure 3.1
REV	0

KAI TAK AIRPORT NORTH AFRICA DECOMMISSIONING

TITLE

Representative Construction
Noise Sensitive Receivers

Maunsell

INCORPORATED

環 科 研 有 限 公 司

4 WATER QUALITY

4.1 Water Quality Parameters

Monitoring of turbidity in NTU, suspended solids (SS) in mg/l, Oil and grease and chemical oxygen demand (COD) shall be carried out by the ET to ensure that any deteriorating water quality could be readily detected and timely action be taken to rectify the situation. Turbidity should be measured *in-situ* while the rest are determined in laboratory. If there are other water quality parameters recommended in the discharge license (s), they shall also be included in the environmental monitoring work.

In association with the water quality parameters, some relevant data shall also be measured, such as monitoring location, time, water temperature, weather conditions, and any special phenomena and work underway at the construction site etc.

A monitoring record sheet is presented in Appendix A3 for reference.

4.2 Monitoring Equipment

ET Leader should provide the following monitoring equipment:

4.2.1 Turbidity Measurement Instrument

The instrument should be a portable, weatherproof turbidity-measuring instrument complete with comprehensive operation manual. The equipment should use a DC power source. It should have a photoelectric sensor capable of measuring turbidity between 0-1000 NTU (e.g. Hach model 2100P or an approved similar instrument).

4.2.2 Sample Container and Storage

- (a) water samples for suspended solids (SS) analysis should be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen), delivered to the laboratory, and analysed as soon as possible after collection.
- (b) water samples for oil & grease measurement should be stored in glass bottles, acidified to pH 2 or lower with 1:1 HCl, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory as soon as possible after collection.
- (c) water sample for COD measurement should be stored in glass or plastic bottles, acidifies to pH 2 using concentrated H₂SO₄, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory as soon as possible after collection.

4.2.3 Calibration of In-situ Equipment

All *in-situ* monitoring instrument shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring.

For the on site calibration of field equipment, the BS 1427:1993, "Guide to Field and on-site test methods for the analysis of waters" should be observed.

Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment some equipment is under maintenance, calibration, etc.

4.3 Laboratory Measurement / Analysis

Analysis of suspended solids, oil and grease as well as COD shall be carried out in a HOKLAS or other international accredited laboratory. Sample volume and maximum storage time for each analytical parameter carried out in the laboratory are shown below in Table 4.1

Table 4.1 Water Sample Handling Requirements

Analytical Parameter	Sample Volume Taken (ml)	Storage Temperature	Maximum Storage Time After Sampling
SS	500	4°C	24 hours
Oil & grease	1000	4°C	7 days
COD	1000	4°C	7 days

If a site laboratory is set up or a non-HOKLAS and non-international accredited laboratory is hired for carrying out the laboratory analysis, the laboratory equipment, analytical procedures, and quality control shall be approved by the DEP. All the analysis shall be witnessed by the ER. The ET Leader shall provide the ER with one copy of the relevant chapters of the "Standard Methods for the Examination of Water and Wastewater" updated edition and any other relevant document for his reference.

For the testing methods of other parameters as recommended by EIA or required by DEP, detailed testing methods, pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per batch, etc.), detection limits and accuracy shall be submitted to DEP for approval prior to the commencement of monitoring programme. - The QA/QC shall be in accordance with the requirement of HOKLAS or international accredited scheme. The QA/QC results shall be

reported. EPD may also request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis shall be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of the method verification may also be required to submit to DEP. In any circumstance, the sample testing shall have comprehensive quality assurance and quality control programmes. The laboratory should prepare to demonstrate the programmes to DEP or his representatives when requested.

4.4 Monitoring Locations

The water quality monitoring locations should be set at all discharge points to be determined by the contractor during the contract design. Due to the nature of the work programme, the discharge points may change from time to time. The actual number of monitoring stations depends on the number of discharge points at a time. The ET Leader shall propose and update monitoring locations and seek approval from the IC(E) and DEP.

4.5 Impact Monitoring

During the course of the construction works, water samples at the discharge points shall be collected three days per week and tested for SS and once per week for oil and grease and COD analyses. *In-situ* turbidity measurement should be conducted three days per week together collecting water samples for SS tests

4.6 Event and Action Plan for Water Quality

All effluent subject to control by the TM are required to be licensed. Therefore, the discharges shall be required to comply with the effluent standard for discharges into Victoria Harbour Inshore Waters. Key parameters are shown in Table 4.2. *It should be noted that the effluent standards listed in the table only apply to flow less than 6,000 m³/day. However, more stringent standards for a larger flow and more parameters may be specified in the discharge license.*

Table 4.2 Selection of Effluent Standards Discharged into Coastal Waters of Victoria Harbour Water Control Zone

Measurement Parameter	Effluent Standard
COD	80 (mg/l)
Suspended solids	30 (mg/l)
Oil & Grease	20 (mg/l)

Source: Technical Memorandum on Effluent Standards, Table 7

No Action level specified
See Table 3 of the EPD
to EPD conditions

Should the monitoring results of the water quality parameters at any designated monitoring station

indicate that the water quality criteria are exceeded, the actions in accordance with the Action Plan in Table 4.3 shall be carried out.

Table 4.3 Event and Action Plan for Water Quality

LIMIT LEVEL	ET LEADER	IC(E)	ER	CONTRACTOR
1. Limit level being exceeded by one sampling day	<ul style="list-style-type: none"> Repeat measurement on next day of exceedance to confirm findings Identify source(s) of impact Inform IC(E), contractor, ER & EPD Check monitoring data, all plant, equipment & contractor's working methods Discuss mitigation measures with IC(E), Contractor & ER. 	<ul style="list-style-type: none"> Checking monitoring data submitted by ET & Contractor's working method Discuss with ET & Contractor on the possible mitigation measures Review the proposed mitigation measures submitted by Contractor & advise the ER accordingly. 	<ul style="list-style-type: none"> Confirm receipt of notification of failure in writing Discuss with IC(E), ET & Contractor on the proposed mitigation measures Request Contractor to review the working methods. Ensure mitigation measures are properly implemented 	<ul style="list-style-type: none"> Inform the ER & confirm notification of the non-compliance in writing Rectify unacceptable practice Check all plant & equipment & consider changes of working methods Discuss with ET, IC(E) and ER and propose mitigation measures to ER and IC(E) within 3 working days Implement the agreed mitigation measures
2. Limit level being exceeded by two or more consecutive sampling days	<ul style="list-style-type: none"> Repeat measurement on the next day of exceedance to confirm findings Identify source(s) of impact Inform IC(E), Contractor, ER & EPD Check monitoring data, all plant, equipment & Contractor's working methods Discuss mitigation measures within IC(E), Contractor & ER Ensure mitigation measures are implemented Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days. 	<ul style="list-style-type: none"> Checking monitoring data submitted by ET & Contractor's working method Discuss with ET & Contractor on potential remedial actions Review Contractor's mitigation measures whenever necessary to assure their effectiveness & advise the ER accordingly Supervise the implementation of mitigation measures. 	<ul style="list-style-type: none"> Discuss with IC(E), ET & Contractor on the proposed mitigation measures Request Contractor to critically review the working methods Make agreement on the mitigation measures to be implemented Ensure mitigation measures are properly implemented Consider & instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level. 	<ul style="list-style-type: none"> Take immediate action to avoid further exceedance Discuss with ET, IC(E) and ER and propose mitigation measures to ER and IC(E) within 3 working days Implement the agreed mitigation measures Resubmit proposals of mitigation measures if problem still not under control As directed by the Engineer, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.

4.7 Water Quality Mitigation Measures

The EIA report has recommended mitigation measures. The Contractor shall be responsible for the design and implementation of these measures. The following is a summary of the recommended measures:

- The good practices outlined in ProPECC PN 1/94 “Construction Site Drainage” should be adhered to as far as practicable. These practices include, *inter alia*, the following items:
 - provision of perimeter channels to intercept storm-runoff from outside the site. These should be constructed in advance of site formation works and earthworks
 - sand/silt removal facilities such as sand traps, silt traps and sediment basins should be provided and these facilities should be properly and regularly maintained
 - careful programming of the works to minimize soil excavation works during rainy seasons
 - exposed soil surface should be protected by shotcrete or hydroseeding as soon as possible to reduce the potential of soil erosion
 - temporary access roads should be protected by crushed gravel
 - open stockpiles of construction materials on site should be covered with tarpaulin or similar fabric during rainstorms
 - before commencing any demolition works, all drainage connections should be sealed to prevent building debris, soil, sand etc. from entering public sewers/drains
 - drainage serving an open oil filling point should be connected to storm drains via a petrol interceptor with peak storm bypass
 - for construction activities near existing storm drains/nullahs, precautions should be taken to prevent spillage of excess materials into the drain. If practical, the water run inside the channel should be separated from the construction activities, e.g. by means of sheet piles
 - stockpiles should be placed at locations away from the edge of the channel to minimise introduction of materials into the channel, either due to surface runoff or careless behaviour of the workers
- Septic tanks or chemical toilets and grease traps for wastewater generated from the canteen should be provided. Any such treatment facilities should be frequently maintained to ensure proper function

- Production water should be re-cycled to minimize the wastewater discharge, where possible
- *For decontamination process, the biopile would be covered by a flexible membrane, lined with HDPE liner, weighed down by sand bags. Perimeter berm should be considered to contain leachate. The leachate shall be collected and disposed as chemical waste. The small amount of entrained liquid in the SVE vapour line would be treated by an oil interceptor and re-injected to Air Sparging (AS) zone for further treatment*
- *schedule the excavation in dry season*
- Using containment (e.g. sand bag and temporary bund) during demolition of fuel tanks to prevent oil spill. Soaking up small patches of spilled oil by oil adsorbent and disposed of as chemical waste.

If the above measures are not sufficient to restore the water quality to an acceptable levels upon the advice of the ET Leader, the Contractor shall liaise with the ET Leader on some other mitigation measures, propose to IC(E) and ER for approval, and carry out the mitigation measures.

The implementation schedule of mitigation measures is presented in Appendix B3.

5 LAND CONTAMINATION

5.1 Land Contamination Parameters

During the closure assessment and post remediation monitoring, soil and groundwater samples shall be carried out by the ET to ensure that any deteriorating soil and groundwater quality could be readily detected and timely action be taken to rectify the situation.

Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethylbenzene and Xylene (BTEX) shall be analysed in an accredited laboratory in order to ensure that the soil and groundwater quality meets the remediation standards and there is no "natural rebound" of contaminant at the site. Methane gas shall also be monitored on-site by means of portable gas analyser during the two exercises.

A monitoring record sheet is presented in Appendix A4 for reference.

5.2 Monitoring Equipment

ET Leader should provide the following monitoring equipment:

5.2.1 Soil Sampling

- (a) rotary drilling rig / hollow stem auger for environmental drilling
- (b) steam cleansing equipment for decontamination of equipment
- (c) stainless steel split spoon sampler.

5.2.2 Groundwater Sampling

- (a) standpipe and well screen (75mm inside diameter) made of an appropriate chemically resistant PVC
- (b) surge block
- (c) Teflon bailer
- (d) interface probe.

5.2.3 Soil Gas Monitoring

- (a) portable gas analyser that can measure 0-100% Lower Explosive Limit (LEL) and 0-100% v/v of methane.

5.2.4 Sample Container and Storage

- (a) soil samples for TPH and BTEX analysis should be stored in 250 ml solvent rinsed glass jars with Teflon lined lid, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory as soon as possible after collection

- (b) groundwater samples for VOC and TPH analysis should be stored in 40 ml glass vials with HCl as preservative, packed in ice (cooled to 4°C without being frozen), and delivered to the laboratory as soon as possible after collection.

5.3 Laboratory Measurement / Analysis

Soil and groundwater analysis shall be carried out in a HOKLAS or other international accredited laboratory. The methods employed for the chemical analysis for the soil and groundwater samples are summarised in Tables 5.1 and 5.2 respectively.

Table 5.1 Methods Employed for Soil Samples Analysis

Parameter	Method
TPH	USEPA 8015 (modified); GCMS/FID

Table 5.2 Methods Employed for Groundwater Samples Analysis

Parameter	Method
Benzene	USEPA 8260A; GCMS
TPH	USEPA 8015 (modified); GCMS/FID

5.4 Monitoring Locations

Monitoring will be carried out in two phases: (1) closure assessment and (2) post remediation monitoring.

For the closure assessment, sampling and analysis of soil, groundwater and soil gas shall be undertaken at fifty locations within the site.

- (a) soil collected at 50 new soil sampling locations (samples to be obtained at 2 depths for each of the 50 locations)
- (b) groundwater sampled at 50 air injection wells
- (c) floating oil monitored at 50 air injection wells
- (d) soil gas measured at 50 locations within the site area.

The ET leader shall propose final monitoring locations and ask approval from the ER and agreement from the IC(E). It is anticipated that the locations are denser at contaminated plume areas.

5.5 Site Closure Assessment

Remediation target has been set and tabulated in Table 5.3.

Table 5.3 Remediation Target

Matrix	Key Remediation Parameter	Remediation Target
Soil	TPH	Dutch B Level (1000 ppm TPH)
Floating Oil	TPH	0.5 mm
Groundwater	Benzene	17 µg l ⁻¹
Soil Gas	Methane	10%-20% of the lower explosive limit (i.e. 0.5 - 1% (v/v))

The testing results are considered satisfactory when the levels of contaminants in 95% of the samples meet the remediation target. The remediation target will also be employed as the reference for the testing of “natural rebound” of contaminant level at the site during post remediation monitoring.

5.6 Post Remediation Monitoring

The ET shall carry out the post remediation monitoring. For the post remediation monitoring about 30 locations across the site will be selected for soil, groundwater and soil gas monitoring. The parameters will be monitored quarterly to ensure there is no “natural rebound” for a period of 2 years. Some of the site closure assessment locations will be reused.

5.6.1 Soil Sampling and Analysis

Drilling shall be accomplished using a standard rotary drilling rig or hollow stem auger. All equipment in contact with the ground shall be thoroughly decontaminated prior to use at each hole by steam cleaning. Soil samples shall be taken using a split spoon sampler with a 0.5 m long sleeve insert. All soil cuttings generated by the drilling shall be contained on-site in drums for off site disposal. At each location two soil samples shall be taken; one sample shall be taken at, or in immediate proximity to, soil surface level, and one sample shall be taken at a depth of 3 m below soil surface level.

Between samples, all equipment used for sample handling and storage shall be thoroughly steam cleaned and decontaminated. Samples shall be stored in pre-washed glass containers, chilled with ice, and transported to the laboratory and assayed within 12 hours of the sample being taken.

All samples shall be uniquely labelled. All samples shall be described on-site prior to laboratory

analysis. Description shall include, but not be restricted to:

- (a) allocated unique sample ID;
- (b) depth of sample from soil surface level;
- (c) colour photograph;
- (d) estimated physical characteristics (clay, silt, sand, gravel, stone, cobble, colour, odour, moisture; and
- (e) any other relevant information.

Laboratory analyses shall be carried out for each soil sample as indicated in Table 5.1. All analyses shall be undertaken by a HOKLAS accredited laboratory approved by the ER.

5.6.2 Groundwater Sampling and Analysis

For each location a groundwater sampling well shall be installed into the same hole from which the soil samples were taken. The ET shall ensure that the hole is of sufficient diameter to accept the well. The well shall be installed such that the screen traverses the groundwater table and extends to a depth 2 m below groundwater level. The well shall comprise a standpipe and screen, and shall be constructed of an appropriate chemically resistant PVC. These specifications shall be proposed by the ET Leader and approved by the ER. The standpipe and screen shall have an inside diameter of 75mm.

Following installation the well shall be developed using a surge block to displace fine materials from the filter pack. Five volumes of water shall then be bailed from the well.

Two days after well development, the thickness of any free product layer shall be measured at each well. The depth to groundwater shall also be measured. One groundwater sample shall then be taken at each location using a Teflon bailer. Between samples, all equipment used for sample handling and storage shall be thoroughly cleaned using distilled water. Samples shall be stored in appropriate pre-washed containers, chilled with ice, and transported to the laboratory for testing within 12 hours of the sample being taken. Laboratory analysis shall be carried out for each groundwater sample as indicated in Table 5.2. Sample analysis shall be undertaken by a HOKLAS accredited laboratory approved by the ER.

5.7 Event and Action Plan for Land Contamination

The remediation target specified in Table 5.3 forms the basis for determining the quality of soil and groundwater for both closure assessment and post remediation monitoring.

Should non-compliance of the soil and groundwater quality occur, actions in accordance with the Action Plan indicated in Table 5.4 shall be carried out.

5.8 Mitigation Measures

The mitigation measures include the following possibilities:

- 1) increase monitoring frequency and use of risk assessment to demonstrate the contaminant level is being lowered naturally by passive attenuation
- 2) use of free product wells to clean up “source areas” which caused natural rebound.
- 3) lengthen SVE/AS operation
- 4) in extreme case, employ limited excavation and extend biopiling.

The above mitigation measures may entail the extension of the project period, and the Contractor shall seek agreement from the relevant authorities before proceeding.

The implementation schedule is presented in Appendix B4.

Table 5.4 Event and Action Plan for Land Contamination

EVENT	ET	ACTION		
		IC(E)	ER	CONTRACTOR
REMEDIATION TARGET				
1. Exceedance for more than 5% of the samples during closure assessment	<ul style="list-style-type: none"> Inform IC(E) and ER Repeat measurement to confirm finding 	<ul style="list-style-type: none"> Check data submitted by ET Check Contractor's working method 	<ul style="list-style-type: none"> Notify Contractor 	<ul style="list-style-type: none"> Carry out further remediation work (e.g. excavate soil for biopiling, remove residual free product)
2. Exceedance for more than 5% of the samples during post remediation monitoring	<ul style="list-style-type: none"> Inform IC(E) and ER Repeat measurements to confirm findings Increase monitoring frequency Discuss with IC(E) and Contractor on remedial actions required If exceedance continues, arrange meeting with IC(E) and ER If exceedance stops, cease additional monitoring 	<ul style="list-style-type: none"> Checking monitoring data submitted by ET Check Contractor's working method Discuss with ET and Contractor on possible remedial measures Advise the ER on the effectiveness of the proposed remedial measures Supervisor implementation of remedial measures 	<ul style="list-style-type: none"> Confirm receipt of notification of failure in writing Notify Contractor Ensure remedial measures properly implemented 	<ul style="list-style-type: none"> Submit proposals for remedial to IC(E) within 3 working days of notification Implement the agreed proposals Amend proposal if appropriate

6 WASTE MANAGEMENT

*Based on Para 4 in App 72
in RPP conditions*

The Contractor is responsible for waste control within the construction site, removal of the waste material produced from the site and to implement any mitigation measures to minimise waste or redress problems arising from the waste from the site. The waste material may include any sewage, waste water or effluent containing sand, cement, silt or any other suspended or dissolved material or refuse to be deposited anywhere within the site or onto any adjoining land.

When handling the waste material, the following measures shall be undertaken:

- Provide storage areas and processing (crushing plant) facilities for construction and demolition material
- Separate non-inert and inert waste and dispose to appropriate locations
- Store chemical waste separately and engage a licensed chemical contractor to dispose the waste to Tsing Yi Chemical Waste Treatment Plant
- Provide on-site refuse collection points
- Conduct investigation for the presence of asbestos
- Register with EPD as chemical waste producer

The implementation schedule of mitigation measures is presented in Appendix B5.

The Contractor shall also pay attention to the Waste Disposal Ordinance, the Public Health and Municipal Services Ordinance and the Water Pollution Control Ordinance, and carry out the appropriate waste management work.

During the site inspections and the document review procedures as mentioned in Sections 6.1 and 6.2 of this manual, 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 (see paragraph above) of Hong Kong.

7 SITE ENVIRONMENTAL AUDIT

7.1 Site Inspections

Based on
Form 9.18.03
GPD on-site

Site inspections provide a direct means to check and enforce the specified environmental protection and pollution control measures. They shall be undertaken routinely to inspect the construction activities in order to ensure that 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, the site inspection is one of the most effective tools to enforce the environmental protection requirements on the construction site.

The ET Leader is responsible for formulation of the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. He shall submit a proposal on the site inspection, deficiency and action reporting procedures within 21 days of the construction contract commencement to the Contractor for agreement and to the ER for approval. The ET's proposal for rectification would be made known to the IC(E).

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:

- (a) the EIA recommendations on environmental protection and pollution control mitigation measures
- (b) works progress and programme
- (c) individual works methodology proposals (which shall include proposal on associated pollution control measures)
- (d) the contract specifications on environmental protection
- (e) the relevant environmental protection and pollution control laws
- (f) previous site inspection results.

The Contractor shall update the 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 the IC(E) and the Contractor within 24 hours, for reference and for taking immediate action. 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.

A mitigation implementation status proforma and a site inspection proforma are provided in Appendix C1 and C2 respectively.

7.2 Compliance with Legal and Contractual Requirements

*Based on para 4.9 mg 87
by [unclear]*

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 that the works are in compliance with the contractual requirements, all the works method statements submitted by the Contractor to the ER 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 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 and the ER accordingly.

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

A regulatory compliance proforma is presented in Appendix C3.

7.3 Environmental Complaints

Based on para 4.12 of the guidelines

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

- (a) log complaint and date of receipt onto the complaint database and inform the IC(E) immediately
- (b) investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities
- (c) if a complaint is valid and due to works, identify mitigation measures in consultation with the IC(E)
- (d) if mitigation measures are required, advise the Contractor accordingly
- (e) review the Contractor's response on the identified mitigation measures, and the updated situation
- (f) if the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD
- (g) undertake additional monitoring and audit to verify the situation if necessary, and review that any valid reason for complaint does not recur
- (h) 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)
- (i) record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

During the complaint investigation work undertaken by the ET, 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 (in consultation with the IC(E)) 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 complaint log sheet is provided in Appendix C4.

ET leader should provide a flow chart of the complaint response procedures. This should address complaint receiving channels, responsible parties/contacts for information/action, the investigation processes, procedures for the implementation of mitigation measures, guidelines for communication and public relation with the complainant.

8 REPORTING

Based on APP BS in TPP Guideline

8.1 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. All the monitoring data (baseline and impact) shall also be submitted on diskettes in a format agreed by ER and EPD.

8.2 Baseline Monitoring Report

The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 working days of completion of the baseline monitoring. Copies of the Baseline Environmental Monitoring Report shall be submitted to each of the four parties: the Contractor, the IC(E), the ER and the EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies required. The form at and content of the report, and the representation of baseline monitoring data shall be to the satisfaction of EPD and include, but not be limited to the following:

- (a) up to half a page executive summary
- (b) brief project background information
- (c) drawings showing locations of the baseline monitoring stations
- (d) an updated construction programme with milestones of environmental protection/mitigation activities annotated
- (e) monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology
 - name of laboratory and type of equipment used and calibration details;
 - parameters monitored
 - monitoring locations (and depth)
 - monitoring date, time, frequency and duration
 - QA/QC results and detection limits
- (f) 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
- (g) determination of the Action and Limit Levels for each monitoring parameter and statistical analysis of the baseline data
- (h) revisions for inclusion in the EM&A Manual
- (i) comments and conclusions.

8.3 EM&A Reports

The results and findings of all EM&A work required in the Manual shall be recorded in the

monthly EM&A reports prepared by the ET Leader. The EM&A report shall be prepared and submitted within 10 working days of the end of each reporting month, with the first report due in the month after construction commences. A maximum of 4 copies of each monthly EM&A report shall be submitted to each of the four parties: the Contractor, the IC(E), the ER and the 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. The ET leader shall review the number and location of monitoring stations and parameters to monitor every 6 months or on an as needed basis in order to cater for the changes in surrounding environment and nature of works in progress.

8.3.1 First Monthly EM&A Report

The first monthly EM&A report shall include at least but not be limited to the following:

- (a) Executive summary (1-2 pages)
 - breaches of Action and Limit levels
 - complaint log
 - notifications of any summons and successful prosecutions
 - reporting changes
 - future key issues.
- (b) Basic project information
 - project organisation including key personnel, contact names and telephone numbers
 - construction programme with fine tuning of construction activities showing the interrelationship with environmental mitigation measures for the month
 - management structure
 - works undertaken during the month.
- (c) Environmental status
 - works undertaken during the month with illustrations such as location of works
 - drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring stations.
- (d) Summary of EM&A requirements
 - all monitoring parameters
 - environmental quality performance limits (Action and Limit levels)
 - Event-Action Plans
 - environmental mitigation measures, as recommended in the project EIA study final report
 - environmental requirements in contract documents.
- (e) Implementation status
 - advice on the implementation of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report,

summarised in the updated implementation schedule.

- (f) Monitoring results (in both hard and diskette copies)
 - monitoring methodology
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored
 - monitoring locations
 - monitoring date, time, frequency, and duration
 - weather conditions during the period
 - any other factors which might affect the monitoring results
 - QA/QC results and detection limits.

- (g) Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
 - record of all noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
 - record of all 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, results and summary
 - review of the reasons for, and the implications of, non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures
 - description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance.

- (h) Others
 - an account of the future key issues as reviewed from the works programme and work method statements
 - advice on the solid and liquid waste management status
 - submission of implementation status proforma, environmental protection proforma, regular compliance proforma, site inspection proforma and complaint log, etc, summarising EM&A of the period.

8.3.2 Subsequent EM&A Reports

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

- (a) Executive Summary (1-2 pages)
 - breaches of Action and Limit levels
 - complaint log
 - notification of any summons and successful prosecutions

- reporting changes
 - future key issues.
- (b) Environmental status
- construction programme with fine tuning of construction activities showing the interrelationship with environmental protection/mitigation measures for the month
 - works undertaken during the month with illustrations
 - drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring stations.
- (c) Implementation status
- advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the project EIA study report, summarised in the updated implementation schedule.
- (d) Monitoring results
- monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored
 - monitoring locations
 - monitoring date, time, frequency, and duration
 - weather conditions during the period
 - any other factors which might affect the monitoring results
 - QA/QC results and detection limits.
- (e) Report on Non-compliance, Complaints, Notifications of Summons and Successful Prosecutions
- record of all noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
 - record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary
 - record of all 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, results and summary
 - review of the reasons for, and the implications of, non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures
 - a description of the actions taken in the event of noncompliance and deficiency reporting and any follow-up procedures related to earlier noncompliance.

- (f) Others
 - an account of the future key issues as reviewed from the works programme and work method statements
 - advice on the solid and liquid waste management status.
- (g) Appendix
 - Action and Limit levels
 - graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - i) 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
 - monitoring schedule for the present and next reporting period
 - cumulative statistics on complaints, notifications of summons and successful prosecutions
 - outstanding issues and deficiencies.

8.4 Quarterly EM&A Summary Reports

The quarterly EM&A summary report which should generally be around 5 pages (including about 3 of text and tables and 2 of figures) should contain at least the following information. Apart from these, the first quarterly summary report should also confirm that the monitoring work is proving effective and that is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

- (a) Up to half a page executive summary
- (b) Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter
- (c) A brief summary of EM&A requirements including:
 - monitoring parameters
 - environmental quality performance limits (Action and Limit levels)
 - environmental mitigation measures, as recommended in the project EIA study final report
- (d) Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation schedule
- (e) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations
- (f) Graphical plots of the trends of monitored parameters over the past 4 months (the last

month of the previous quarter and the present quarter) for representative monitoring stations annotated against:

- the major activities being carried out on site during the period
- weather conditions during the period
- any other factors which might affect the monitoring results

- (g) Advice on the solid and liquid waste management status
- (h) Summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limit levels)
- (i) A brief review of the reasons for, and the implications of, non-compliance including review of pollution sources and working procedures
- (j) A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance
- (k) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken
- (l) A summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation, locations and nature of the breaches, investigation, follow-up actions taken and results
- (m) Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter
- (n) Proponents' contacts and any hotline telephone number for the public to make enquiries.

Apart from the above, the first quarterly summary report should also confirm that the monitoring work is proving effective and that it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works.

8.5 Final EM&A Review Report

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

- (a) Completion of construction activities or insignificant environmental impacts of the remaining outstanding construction works
- (b) trends analysis to demonstrate return towards ambient (baseline) environmental conditions
- (c) No environmental complaint and prosecution involved.

The proposal termination should be endorsed by the IC(E), A/ER and the project proponent prior

to final approval from the Director of Environmental Protection.

The final EM&A report should contain at least the following information:

- (a) Executive summary (1-2 pages)
- (b) Basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the entire construction period
- (c) A brief summary of EM&A requirements including:
 - monitoring parameters
 - environmental quality performance limits (Action and Limit levels)
 - environmental mitigation measures, as recommended in the project EIA study final report
- (d) Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study report, summarised in the updated implementation proformas
- (e) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring stations
- (f) Graphical plots and the statistical analysis of the trends of monitored parameters over the construction project for representative monitoring stations annotated against:
 - the major activities being carried out on site during the period
 - weather conditions during the period
 - any other factors which might affect the monitoring results
 - the return of ambient environmental conditions in comparison with baseline data
- (g) Compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies
- (h) Provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis
- (i) Advice on the solid and liquid waste management status
- (j) A summary of noncompliance (exceedances) of the environmental quality performance limits (Action and Limits levels)
- (k) A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate
- (l) A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance

- (m) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken
- (n) Review the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness)
- (o) A summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results
- (p) Review the practicality and effectiveness of the EIA process and EM&A programme (e.g. effectiveness and efficiency of the mitigation measures), recommend any improvement in the EM&A programme
- (q) A conclusion to state the return of ambient and/or the predicted scenario as per EIA findings

8.6 Data Keeping

The site document 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 document 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 document. The monitoring data shall also be recorded in magnetic media form, and the software copy can be available upon request. All the document and data shall be kept for at least one year after completion of the construction contract.

8.7 Interim Notifications of Environmental Quality Limit Exceedances

With reference to Event/Action Plans in Tables 2.2, 3.2 and 4.3, when the environmental quality limits are exceeded, the ET Leader shall immediately notify the IC(E) & EPD, as appropriate. The notification shall be followed up with advice to IC(E) and EPD on the results of the investigation, proposed action and success of the action taken, with any necessary follow-up proposals. An interim notifications form is shown in Appendix D for reference.

APPENDIX A

**ENVIRONMENTAL MONITORING
DATA RECORDING SHEETS**

**APPENDIX A1.1
DATA SHEET FOR TSP MONITORING**

**APPENDIX A1.2
DATA SHEET FOR TO-14 CANISTER
SAMPLING**

**APPENDIX A2
NOISE MONITORING FIELD RECORD
SHEET**

**APPENDIX A3
WATER QUALITY MONITORING DATA
RECORD SHEET**

**APPENDIX A4
SOIL AND GROUNDWATER SAMPLING
DATA SHEET**

APPENDIX A1.1
Data Sheet for TSP Monitoring

Monitoring Location		
Details of Location		
Sampler Identification		
Date & Time of Sampling		
Elapsed-time Meter Reading	Start (min.)	
	Stop (min.)	
Total Sampling Time (min.)		
Weather Conditions		
Site Conditions		
Initial Flow Rate, Q _{si}	P _i (mmHg)	
	T _i (°C)	
	H _i (in.)	
	Q _{si} (Std. m ³)	
Final Flow Rate, Q _{sf}	P _f (mmHg)	
	T _f (°C)	
	H _f (in.)	
	Q _{sf} (Std. m ³)	
Average Flow Rate (Std. m ³)		
Total Volume (Std. m ³)		
Filter Identification No.		
Initial Wt. of Filter (g)		
Final Wt. of Filter (g)		
Measured TSP Level (µg/m ³)		

	<u>Name & Designation</u>	<u>Signature</u>	<u>Date</u>
Field Operator	:	_____	_____
Laboratory Staff	:	_____	_____
Checked by	:	_____	_____

APPENDIX A1.2
Data Sheet for TO-14 Canister Sampling

A. General Information

Site Location : _____ Canister Serial No. : _____
 Site Address : _____ Mass flow controller
 _____ serial no. : _____
 _____ Cleanliness Test : _____
 _____ Canister Leak Check : _____
 Sampling Date : _____ Operator : _____

B. Sampling Information

Temperature (°C)			Pressure (* in. Hg / Psi)		
Ambient		Maximum	Minimum	Canister Pressure	
Start	Stop			Start	Stop

* Delete as appropriate

	Sampling Time	Canister flow rates (ml/min)
Start		
Stop		
Total		

C. Laboratory Information

Sample I.D. : _____
 Date received : _____
 Received by : _____
 Initial pressure : _____
 Final pressure : _____
 Dilution factor : _____

D. Analysis

Date : _____

E. Results :

Remark :

The flow rate of the mass flow controller does not hold constant when the absolute canister pressure rises above 12 in.Hg

	Name & Designation	Signature	Date
Field Operator :	_____	_____	_____
Laboratory Staff :	_____	_____	_____
Checked by :	_____	_____	_____

APPENDIX A2
 Noise Monitoring Field Record Sheet

Monitoring Location		
Description of Location		
Date of Monitoring		
Measurement Start Time (hh:mm)		
Measurement Time Length (min.)		
Noise Meter Model/Identification		
Calibrator Model/Identification		
Measurement Results	L ₉₀ (dB(A))	
	L ₁₀ (dB(A))	
	Leq (dB(A))	
Major Construction Noise Source(s) During Monitoring		
Other Noise Source(s) During Monitoring		
Remarks		

Name & Designation

Signature

Date

Recorded By :

Checked By :

APPENDIX A3
 Water Quality Monitoring Data Record Sheet

Location		
Date		
Start Time (hh:mm)		
Weather		
Water Depth (m)		
Temperature (°C)		
Turbidity (NTU)		
Sample Identification		
SS (mg/l)		
Oil and grease (mg/l)		
COD (mg/l)		
Observed Construction Activities	<100m from location	
	>100m from location	
Other Observations		

Name & Designation Signature Date

Recorded By : _____

Checked By : _____

Note: The SS results are to be filled up once they are available from the laboratory.

APPENDIX A4
SOIL AND GROUNDWATER SAMPLING
DATA SHEET

Soil & Groundwater Sampling & Testing

From:
To:
Job/Ref No:
Page _____ of _____

Project No: _____

Date of Sampling: _____ Weather: _____

Sampling Site: _____ Sampling Conducted by: _____

Sampling Method:

(a) Soil _____

(b) Groundwater _____

Sample Container

(a) Soil: Each sample was held in _____ (no.) _____ (ml) P/G bottle.

(b) Groundwater: Each sample was held in
_____ (no.) _____ (ml) P/G bottle, Preservatives: _____
_____ (no.) _____ (ml) P/G bottle, Preservatives: _____
_____ (no.) _____ (ml) P/G bottle, Preservatives: _____

(1) Soil

Sample No.	Sampling Location	Sampling Depth from Soil Surface (m)	Time of Sampling	Texture	Soil Screening Result

APPENDIX A4
 SOIL AND GROUNDWATER SAMPLING
 DATA SHEET

Soil & Groundwater Sampling & Testing
 (Continued)

From:
To:
Job/Ref No:
Page _____ of _____

Project No: _____ Date of Sampling: _____

Sampling Location: _____

(1) Soil (continued)

Soil Screening Method: by HNU Nordan Field Test Kit

Testing Conducted by: _____

Testing Period: From _____ (: am/pm) to _____ (: am/pm)

Testing Location: _____

(2) Groundwater

Sample No.	Sampling Location	Sampling depth from Water Surface (m)	Time of Sampling

(3) Sample delivery

Samples were sent to _____ on _____, under _____ condition.

Sample: _____ were sent to _____ (Lab) for the testing of

_____ on _____, under _____ condition.

Prepared by: _____

Checked by: _____

Date: _____

Date: _____

APPENDIX B

**MITIGATION MEASURES
IMPLEMENTATION SCHEDULES**

**APPENDIX B1
IMPLEMENTATION SCHEDULE FOR
AIR QUALITY CONTROL**

**APPENDIX B2
IMPLEMENTATION SCHEDULE FOR
NOISE CONTROL**

**APPENDIX B3
IMPLEMENTATION SCHEDULE FOR
WATER POLLUTION CONTROL**

**APPENDIX B4
IMPLEMENTATION SCHEDULE FOR
LAND CONTAMINATION**

**APPENDIX B5
IMPLEMENTATION SCHEDULE FOR
CONSTRUCTION AND DEMOLITION
WASTE CONTROL**

EIA Ref*	EM&A Log Ref*	Environmental Protection Measures	Location/Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec
8.2	2.8	Regular watering the entire site	work site / during construction	contractor		✓		
8.2	2.8	Frequent watering for particularly dusty static areas close to site boundary and sensitive receivers	work site / during construction	contractor		✓		
8.2	2.8	Side enclosure and covering of any aggregate or dusty material storage piles.	work site / during construction	contractor		✓		
8.2	2.8	Covering stockpiles and placing them away from receivers	work site / during construction	contractor		✓		
8.2	2.8	Providing barriers where possible	work site / during construction	contractor		✓		
8.2	2.8	Covering all dusting vehicle loads transported to, from and between site location with tarpaulin	vehicles / during transportation	contractor		✓		
8.2	2.8	Establishing and using vehicle and body washing facilities at the exit points	site exit points / during construction	contractor	✓	✓		
8.2	2.8	Providing wind shield and dust extractor, as well as using water sprinklers at loading and unloading points	loading and unloading points / during construction	contractor		✓		
8.2	2.8	Imposing speed control for vehicles on dusty site areas	dusty site areas / during construction	contractor		✓		
8.2	2.8	Routing vehicles and positioning plant away from receivers where possible	work site / during construction	contractor		✓		
8.2	2.8	Installing a crusher feedbox with a minimum number of openings and use of rubber curtains for the crushing plant	crushing plant / during its operation	contractor	✓	✓		
8.2	2.8	Choking feed the crusher to reduce air entrainment and dust emission	crushing plant / during its operation	contractor		✓		
8.2	2.8	A catalytic incinerator should be installed to exhaust fuel and oil vapour extracted from the contaminated site prior to their discharge to atmosphere.	work site / during decontamination	contractor	✓	✓		
8.2	2.8	Covering the biopile and venting the gas to a catalytic incinerator	work site / during decontamination	contractor	✓	✓		
8.2	2.8	Limiting the excavation rates to allow adequate vapour dispersion	work site / during decontamination	contractor	✓	✓		
8.2	2.8	Instigating a monitoring programme during the demolition & decontamination	work site / during demolition & decontamination	Environmental Team	✓	✓		

* EIA Ref = section number of EIA report; EM&A Log Ref = section number of EM&A manual.

** Des = Design, C = Construction, O = Operation, Dec = Decommissioning

Signed by Project Proponent: _____

Date: _____

EIA Ref*	EM&A Log Ref*	Environmental Protection Measures	Location/Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec
8.1	3.7	Careful programming construction activities to avoid parallel operation of several sets of equipment, reducing concurrently operating items of plant and minimise exposure of nearby receivers	work site / during construction	contractor		✓		
8.1	3.7	Siting noisy equipment away from receivers as far as practical	work site / during construction	contractor		✓		
8.1	3.7	Turning off or throttled down idle equipment	work site / during construction	contractor		✓		
8.1	3.7	Properly maintaining and operating construction equipment. Properly maintaining and using silencing equipment	work site / during construction	contractor		✓		
8.1	3.7	Use of quiet equipment ¹	work site / during construction	contractor		✓		
8.1	3.7	Instigating a noise monitoring programme	closest NSR / during construction	Environmental Team	✓	✓		

* EIA Ref = section number of EIA report; EM&A Log Ref = section number of EM&A manual.

** Des = Design, C = Construction, O = Operation, Dec = Decommissioning

1. List of quieter equipment is presented in B2b

Signed by Project Proponent: _____

Date: _____

Item	Number	Unmitigated PME		Quieter PME	
		SWL per Item, dB(A)	TM Reference	SWL per Item, dB(A)	Reference
Demolition of Existing Structure					
Excavator/loader	1	112.0	CNP 081	105.0	BS5228, Table 7, Item 59
Bulldozer	1	115.0	CNP 030	109.0	BS5228, Table 7, Item 27
Rock drill, hand held	1	116.0	CNP 183	114.0	BS5228, Table 7, Item 55
Mounted breaker	1	122.0	CNP 027	122	CNP 027
Total SWL, dB(A)		124.0		122.5	
Installation of Remediation					
Excavator/Loader	4	112.0	CNP 081	105.0	BS5228, Table 7, Item 59
Air compressor	1	100.0	CNP 001	100.0	CNP 001
Lorry	1	112.0	CNP 141	105.0	BS5228, Table 7, Item 59
Breaker, hand held	1	108.0	CNP 024	108.0	CNP 024
Water pump	4	88.0	CNP 281	88.0	CNP 281
Total SWL, dB(A)		119.5		113.5	
Apron Concrete Removal					
Excavator/loader	1	112.0	CNP 081	105.0	BS5228, Table 7, Item 59
Crawler rock drill	1	123.0	CNP 182	119.0	BS5228, Table 6, Item 4
Hydraulic rock breaker	1	108.0	CNP 024	108.0	CNP 024
Total SWL, dB(A)		123.5		119.5	

EIA Ref*	EM&A Log Ref*	Environmental Protection Measures	Location/Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec
8.3	4.8	Providing perimeter channels to intercept run-off from outside the site	around the work area / beginning of construction	contractor	✓	✓		
8.3	4.8	Providing of sand/silt traps, oil inceptors and septic tanks/or chemical toilets. Proper maintaining these facilities.	work site / beginning of construction	contractor		✓		
8.3	4.8	Careful programming work to avoid excavation in the raining season	work site / all the time during construction	contractor		✓		
8.3	4.8	Recycling production water where practical	work site / during construction	contractor		✓		
8.3	4.8	Protecting exposed soil by shotcrete or hydroseedings and road by crushed gravel	work site / during construction	contractor		✓		
8.3	4.8	Covering stockpile with tarpaulin or similar material during rainstorms and placing stockpiles away from water course	work site / during construction	contractor		✓		
8.3	4.8	Protecting drains from spillages of excess materials and sealing drains prior to demolition work	work site / prior to demolition	contractor		✓		
8.3	4.8	Connecting drainage serving an open oil filling point to a petrol interceptor prior to discharge	work site / during construction	contractor		✓		
8.3	4.8	<i>Lining biopile at the bottom, covering it at the top and weighting down by sand bags to prevent water from sipping through. Construction a perimeter berm to contain leachate. Collected leachate should be disposed off as chemical waste. Treating the entrained liquid in the SVE vapour line prior to discharge</i>	decontamination sites / during decontamination	contractor		✓		
7.3.1	4.8	Using containment (eg sand bag and temporary bund) during demolition of fuel tanks to prevent oil spill. Socking up small patches of spilled oil by oil adsorbent and disposed of as chemical waste	OCTF decontamination site/ during decontamination	contractor		✓		
8.3	4.8	For stockpile, providing perimeter channels to intercept run-off from outside the area. The collected run-off should go through sand/silt traps prior to discharges.	Landfarming site / during decontamination	contractor	✓	✓		
8.3	4.8	Collected wastewater (leachate) within landfarming area should be disposed of as chemical waste	Landfarming site / during decontamination	contractor	✓	✓		
8.3	4.8	Schedule the excavation in dry season	Landfarming site / during decontamination	contractor	✓	✓		

EIA Ref*	EM&A Log Ref*	Environmental Protection Measures	Location/Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec
8.3	4.8	Instigating a water quality monitoring programme	discharge points / during construction	Environmental Team	✓	✓		

* EIA Ref = section number of EIA report; EM&A Log Ref = section number of EM&A manual
 ** Des = Design, C = Construction, O = Operation, Dec = Decommissioning

Signed by Project Proponent: _____

Date: _____

The implementation schedule for land contamination is the full scope of the remedial action plan (the present decontamination project).

Environmental Protection Measures	Location/Timing	Implementation Agent	Implementation Stages**			
			Des	C	O	Dec
Construction and operation of SVE/AS plant for Hotspot B	work site / during construction	contractor		✓		
Excavation and biopiling of soil from Hotspot A nd Hotspot C	work site / during construction	contractor		✓		
Free product recovery wells (if required following recommendation of pilot plant)	work site / during construction	contractor		✓		
Excavation and biopiling of soil from free product areas from Hotspot B (Fall back option)	work site / during construction	contractor		✓		
Site closure assessment	work site / during construction	Environmental Team	✓	✓		
Post remediation monitoring	work site / during construction	Environmental Team	✓	✓		

* EIA Ref = section number of EIA report; EM&A Log Ref = section number of EM&A manual.

** Des = Design, C = Construction, O = Operation, Dec = Decommissioning

Signed by Project Proponent: _____

Date: _____

EIA Ref*	EM&A Log Ref*	Environmental Protection Measures	Location/Timing	Implementation Agent	Implementation Stages**			
					Des	C	O	Dec
8.4	5	Providing storage areas and processing (crushing plant) facilities for construction and demolition material	work site / during construction	contractor	✓	✓		
8.4	5	Separating non-inert and inert waste and responsible for their disposal to appropriate locations	work site / during construction	contractor		✓		
8.4	5	Storing chemical waste separately and engaging a licenced chemical contractors to disposal the waste to Tsing Yi Chemical Waste Treatment Plant	work site / during construction	contractor		✓		
8.4	5	Providing on-site refuse collection points	work site / during construction	contractor		✓		
8.4	5	Conducting investigation for the presence of asbestos	buildings / prior to demolition	contractor	✓	✓		
8.4	5	Register with EPD as chemical waste producer	- / prior to construction	contractor		✓		

* EIA Ref = section number of EIA report; EM&A Log Ref = section number of EM&A manual
 ** Des = Design, C = Construction, O = Operation, Dec = Decommissioning

Signed by Project Proponent: _____

Date: _____

APPENDIX C

ENVIRONMENTAL PROFORMAS

**APPENDIX C1
IMPLEMENTATION STATUS
PROFORMA**

**APPENDIX C2
SITE INSPECTION PROFORMA**

**APPENDIX C3
REGULATORY COMPLIANCE
PROFORMA**

**APPENDIX C4
COMPLAINT LOG**

APPENDIX C1 IMPLEMENTATIONS STATUS PROFORMA

Ref: _____

Ref**	Environmental Protection Measures*	Implementation Status

* All recommendations and requirements resulted during the Course of EIA/EA Process, including ACE and for accepted public comment to the proposed project
 ** EIA Ref/EM&A Log Ref/Design Document Ref

Signed by Environmental Team Leader: _____ Date: _____

Audited by Independent Checker (Environment): _____ Date: _____

APPENDIX C2 SITE INSPECTION PROFORMA

Ref: _____

Date	Location	Req't Ref.*	Observation/Deficiency	Mitigation Action** (Responsible Agency)	Date*** of Confirmation

- * EIA Ref/EM&A Log Ref/Design Document Ref/Environmental Protection Contract Clause
- ** Specific Environmental Mitigation Measures should be stated, such as, equipment, process, systems, practices or technologies
- *** The required completion date to confirm the specified Environmental Protection Action

This Proforma is an Environmental Protection Instruction for: _____ on _____

Signed by Environmental Team Leader: _____ Date: _____

Copy to Independent Checker (Environment)

projects\c415\drafts\em&a\app_em&a.c

APPENDIX C3 REGULATORY COMPLIANCE PROFORMA

Ref: _____

Ref**	Environmental License/Permit*	Control Area/Facility/Location	Effective Date

* Name of Applicant, Business Corporation, relevant regulation and remark of license/permit conditions
 ** File reference of the license/permittee

Recorded by Environmental Team Leader: _____ Date: _____

Signed by Independent Checker (Environment): _____ Date: _____

APPENDIX C4 COMPLAINT LOG

Ref: _____

Log Ref	Date/Location	Complainant/ Date of Contact	Details of Complaint	Investigation/ Mitigation Action	File Closed

Filed by Environmental Team Leader: _____

Date: _____

APPENDIX D

**INTERIM NOTIFICATION OF
ENVIRONMENTAL QUALITY LIMIT
EXCEEDANCES**

APPENDIX D

**INTERIM NOTIFICATIONS OF ENVIRONMENTAL QUALITY
LIMITS EXCEEDANCES**

Incident Report on Action Level or Limit Level Non-compliance

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

Location Plan

Prepared by : _____

Designation : _____

Signature : _____

Date : _____