

Consultancy Agreement No. NEX/2213

Environmental Impact Assessment (EIA) Study for Shatin to Central Link - Mong Kok East to Hung Hom Section



TABLE OF CONTENTS

1.	INTRODUCTION	1-1
	Project Description.....	1-1
	Purpose of the Manual.....	1-1
	Project Organisation	1-2
	Structure of the EM&A Manual	1-3
2.	LANDSCAPE AND VISUAL	2-1
	Introduction	2-1
	Mitigation Measures.....	2-1
	Audit Requirements	2-1
3.	AIR QUALITY	3-1
	Introduction	3-1
	Construction Phase.....	3-1
	Operation Phase	3-8
	Mitigation Measures.....	3-8
4.	AIRBORNE NOISE	4-1
	Introduction	4-1
	Construction Noise.....	4-1
	Operation Noise – Rail Operation	4-5
	Operation Noise – Fixed Plant.....	4-5
	Mitigation Measures.....	4-6
5.	GROUND-BORNE NOISE	5-1
	Introduction	5-1
	Construction Ground-borne Noise	5-1
	Operation Ground-borne Noise	5-1
	Mitigation Measures.....	5-1
6.	WATER QUALITY	6-1
	Introduction	6-1
	Construction Phase.....	6-1
	Operation Phase	6-2
	Mitigation Measures.....	6-2
7.	WASTE MANAGEMENT ISSUES	7-1
	Introduction	7-1
	Mitigation Measures.....	7-1
8.	LAND CONTAMINATION ISSUE.....	8-1
	Mitigation Measures.....	8-1
9.	ENVIRONMENTAL AUDITING	9-1
	Site Inspection	9-1
	Environmental Compliance	9-1
	Choice of Construction Method	9-2
	Environmental Complaints	9-2
10.	REPORTING	10-1
	Introduction	10-1
	Baseline Monitoring Report	10-1
	Monthly EM&A Reports.....	10-1
	Data Keeping	10-6
	Real-Time Reporting.....	10-6
	Interim Notifications of Environmental Quality Limit Exceedances	10-6

List of Tables

Table 2.1	Event / Action Plan for Landscape and Visual during Construction Stage
Table 3.1	Construction Dust Monitoring Stations
Table 3.2	Summary of Construction Dust Monitoring Programme
Table 3.3	Proposed Action and Limit Levels for Construction Dust Impact Monitoring
Table 3.4	Event and Action Plan for Construction Dust Monitoring
Table 4.1	Noise Monitoring Stations during Construction Phase
Table 4.2	Action and Limit Levels for Construction Noise Impact Monitoring
Table 4.3	Event and Action Plan for Construction Noise Monitoring
Table 4.4	Noise Monitoring Stations during Operation Phase
Table 5.1	Operation Ground-borne Noise Monitoring Location

List of Figures

NEX2213/C/361/ENS/M50/501	SCL Overall Alignment (with Boundary of SCL – Mong Kok East to Hung Hom Section)
NEX2213/C/361/ENS/M50/502	Proposed SCL Alignment and Associated Works Area & Project Boundary (SCL – Mong Kok East to Hung Hom Section)
NEX2213/C/361/ENS/M62/501	Project Organisation
NEX2213/C/361/ENS/M62/510	Locations of Dust Monitoring Stations
NEX2213/C/361/ENS/M62/520	Locations of Noise Monitoring Station (Construction Phase)
NEX2213/C/361/ENS/M62/521	Locations of Noise Monitoring Station (Operation Phase)

List of Appendices

Appendix A	Implementation Schedule and Recommended Mitigation Measures
Appendix B1	Data Record Sheet for TSP Monitoring
Appendix B2	Construction Noise Monitoring Field Record Sheet
Appendix B3	Proactive Environmental Protection Proforma
Appendix C	Sample of the interim Notification
Appendix D	Tentative Construction Programme of the Project

1. INTRODUCTION

Project Description

- 1.1 The Shatin to Central Link (SCL) is strategically important for connecting the existing railway lines into an integrated rail network. The SCL comprises 17 kilometres of rail line that will connect several existing railway lines, creating two distinct east-west and north-south railway corridors. It will also provide interchange opportunities, with six of its ten stations (Tai Wai, Diamond Hill, Homantin, Hung Hom, Exhibition and Admiralty) providing passengers with either an inter-platform or interchange for other lines.
- 1.2 The extension for the north-south corridor is divided into 2 sections, namely Shatin to Central Link – Mong Kok East to Hung Hom Section [SCL (MKK – HUH)] and Shatin to Central Link – Hung Hom to Admiralty Section [SCL (HUH – ADM)]. The overall alignment of the SCL is shown in [Figure No. NEX2213/C/361/ENS/M50/501](#). SCL (MKK – HUH) refers to the railway section from the south of Mong Kok East Station (MKK) to Hung Hom Station (HUH) (hereinafter referred as “the Project”). Whereas, SCL (HUH – ADM) refers to the railway section from Hung Hom Station across the harbour to new Exhibition Station (EXH) and Admiralty Station (ADM). The cut-off demarcation between SCL (MKK – HUH) and SCL (HUH – ADM) are located at the north of the proposed North Ventilation Building, Plant Rooms and Emergency Access (NOV). An overview of the Project and the associated works areas is provided in [Figure No. NEX2213/C/361/ENS/M50/502](#).
- 1.3 The proposed construction of the Project is tentatively scheduled to commence in 2012 for substantial completion in 2018 ([Appendix D](#)). It should be noted that the tentative construction programme will be subject to actual site conditions.

Purpose of the Manual

- 1.4 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the set-up of an EM&A programme to check on compliance with the Environmental Impact Assessment (EIA) study recommendations of the Project, to assess the effectiveness of the recommended mitigation measures, and to identify any further need for additional mitigation measures or remedial actions.
- 1.5 This EM&A Manual aims to provide systematic procedures for monitoring, auditing and minimizing environmental impacts associated with the activities of the Project. It outlines the monitoring and audit programme for the Project.
- 1.6 Hong Kong environmental regulations have served as environmental standards and guidelines in the preparation of this Manual. In addition, the EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).
- 1.7 This Manual contains the following information:
- Responsibilities of the Contractor, the Engineer or Engineer’s Representative, the Environmental Team, and the Independent Environmental Checker with respect to the environmental monitoring and audit requirements during the course of the Project;
 - Project organisation for the Project;
 - Requirements with respect to the construction programme schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
 - Details of the methodologies to be adopted, including all field laboratories and analytical procedures, and details on quality assurance and quality control programme;
 - The rationale on which the environmental monitoring data will be evaluated and interpreted;
 - Definition of Action and Limit levels;
 - Establishment of Event and Action plans;
 - Requirements for reviewing pollution sources and working procedures required in the event of non-compliance with the environmental criteria and complaints;
 - Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures; and

- Requirements for reviewing the EIA predictions and the effectiveness of the mitigation measures / environmental management systems and the EM&A programme.

1.8 This EM&A Manual is a dynamic document that should be reviewed regularly and updated as necessary during the construction and operation of the Project including those updates noted in the EIA.

Project Organisation

1.9 The roles and responsibilities of the various parties involved in the EM&A process and the organisational structure of the organisations responsible for implementing the EM&A programme are outlined below. The proposed project organisation and lines of communication with respect to environmental protection works are shown in [Figure No. NEX2213/C/361/ENS/M62/501](#).

Engineer or Engineer's Representative (ER)

1.10 The Engineer is responsible for overseeing the construction works and for ensuring that the works are undertaken by the Contractor in accordance with the specification and contractual requirements. The duties and responsibilities of the Engineer with respect to EM&A may include:

- 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 environmental impacts in accordance with the Event and Action Plans;
- Participate in joint site inspections and audits undertaken by the Environmental Team (ET); and
- Adhere to the procedures for carrying out complaint investigations.

The Contractor

1.11 The Contractor should report to the ER. The duties and responsibilities of the Contractor are:

- Implement the EIA recommendations and requirements;
- Provide assistance to the ET in carrying out relevant environmental 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 environmental impacts where Action and Limit levels are exceeded until the events are resolved; and
- Adhere to the procedures for carrying out environmental complaint investigation in accordance with Section 9 of this manual.

Environmental Team (ET)

1.12 The ET should conduct the EM&A programme and ensure the Contractor's compliance with the Project's environmental performance requirements during construction. The ET should be an independent party from the Contractor.

1.13 The ET should be led and managed by the ET leader. The ET leader should possess at least 7 years of experience in EM&A. The ET should monitor the mitigation measures implemented by the Contractor on a regular basis to ensure the compliance with the intended aims of the measures. The duties and responsibilities of the ET are:

- Monitor the various environmental parameters as required in the EM&A Manual;
- Carry out site inspections 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 and practicable action before problems arise;
- Liaison with IEC on all environmental performance matters, and timely submission of all relevant EM&A proforma for IEC's approval;
- Analyse the EM&A data, review the success of EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions, and to identify any

- adverse environmental impacts arising and report EM&A results to the IEC and the ER;
- Prepare reports on the environmental monitoring data and the site environmental conditions;
 - Review the proposals of mitigation measure from the Contractor in the case of exceedances of Action and Limit levels, in accordance with the Event and Action Plans;
 - Advice to the Contractor on environmental improvement, awareness, enhancement matters, etc, on site;
 - Timely submission of the EM&A report to the Project Proponent and the EPD; and
 - Adhere to the procedures for carrying out environmental complaint investigation in accordance with **Section 9** of this Manual.

Independent Environmental Checker (IEC)

1.14 The IEC should advise the ER on environmental issues related to the Project. The IEC should possess at least 7 years of experience in EM&A. The duties and responsibilities of the IEC are:

- Review and audit in an independent, objective and professional manner in all aspects of the EM&A programme;
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;
- Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
- Review the effectiveness of environmental mitigation measures and project environmental performance;
- On as-needed basis, verify and certify the environmental acceptability of the Environmental Permit (EP) holder's construction methodology (both temporary and permanent works), relevant design plans and submissions under the EP;
- Carry out random sample check and audit on monitoring data and sampling procedures, etc;
- Conduct random site inspection;
- Verify the investigation results of the environmental complaint cases and the effectiveness of corrective measures;
- Verify EM&A report that has been certified by the ET leader; and
- Provide feedback on the audit results to the ET or the EP holder according to Event and Action Plans in the EM&A manual

Structure of the EM&A Manual

1.15 Following this introductory section, the remainder of the Manual is set out as follows:

- Section 2 – Details auditing requirement for landscape and visual impact;
- Section 3 – Sets out EM&A requirement for air quality;
- Section 4 – Sets out EM&A requirement for airborne noise;
- Section 5 – Sets out EM&A requirement for ground-borne noise;
- Section 6 – Details auditing requirement for water quality;
- Section 7 – Details auditing requirement for waste management;
- Section 8 – Details auditing requirement for land contamination;
- Section 9 – Describes scope and frequency of environmental site audits and sets out the general requirements of the EM&A programme; and
- Section 10 – Details the EM&A reporting requirements.

2. LANDSCAPE AND VISUAL

Introduction

- 2.1 The EIA Report has recommended landscape and visual mitigation measures for the construction and operation phases of the Project. This section defines the audit requirements for effective implementation of the recommended landscape and visual impact mitigation measures.
- 2.2 Site audit on landscape and visual aspects of the Project should be carried out during the construction phase. Specific auditing during the operation phase of the Project is not required, with the mitigation measures recommended in the EIA implemented.

Mitigation Measures

- 2.3 Potential landscape and visual impacts have been carefully considered during the development of the Project design to (1) avoid impacts on important landscape resources as the first priority; and (2) locate, design and reduce physical extent of the works as far as possible, as well as identify mitigation measures, so as to minimize impacts on existing trees and open spaces, and to minimize the degree of visual impact.
- 2.4 The landscape and visual mitigation measures should be incorporated in the detailed design. The construction phase and operation phase mitigation measures proposed in the EIA Report are presented in [Appendix A](#). The construction phase mitigation measures should be implemented as early as possible in order to minimize the landscape impacts in the construction stage while the mitigation measures for the operation phase should be adopted during the detailed design and be built as part of the construction works so that they are in place on the date of commissioning of the Project.
- 2.5 Any potential conflicts among the proposed mitigation measures, the Project works and operational requirements should also be identified and resolved as early as practicable. Any changes to the mitigation measures should be incorporated in the detailed design.

Audit Requirements

- 2.6 Site audits should be undertaken during the construction phase of the Project to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives. Site inspections should be undertaken by the ET at least once every two weeks during the construction period.
- 2.7 In the event of non-compliance, the responsibilities of the relevant parties are detailed in the Event/Action plan provided on [Table 2.1](#).

Table 2.1 Event / Action Plan for Landscape and Visual during Construction Stage

Action Level	ET	IEC	ER	Contractor
Non-conformity on one occasion	<ol style="list-style-type: none"> 1. Inform the Contractor, the IEC and the ER 2. Discuss remedial actions with the IEC, the ER and the Contractor 3. Monitor remedial actions until rectification has been completed 	<ol style="list-style-type: none"> 1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET, ER and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of non-conformity in writing 2. Review and agree on the remedial measures proposed by the Contractor 3. Supervise implementation of remedial measures 	<ol style="list-style-type: none"> 1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	<ol style="list-style-type: none"> 1. Inform the Contractor, the IEC and the ER 2. Increase inspection frequency 3. Discuss remedial actions with the IEC, the ER and the Contractor 4. Monitor remedial actions until rectification has been completed 5. If non-conformity stops, cease additional monitoring 	<ol style="list-style-type: none"> 1. Check inspection report 2. Check the Contractor's working method 3. Discuss with the ET and the Contractor on possible remedial measures 4. Advise the ER on effectiveness of proposed remedial measures 	<ol style="list-style-type: none"> 1. Notify the Contractor 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 3. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Identify Source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with the ER as appropriate 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by the ER until the non-conformity is abated.

Note:

ET – Environmental Team
 IEC – Independent Environmental Checker
 ER – Engineer's Representative

3. AIR QUALITY

Introduction

- 3.1 Potential air quality impact arising from the construction works would mainly be related to construction dust from excavation, materials handling, spoil removal, temporary stockpiles and wind erosion, as well as operation of barging facilities. As construction dust is the prime concern, monitoring should be carried out to evaluate the dust impact during the construction phase. Total Suspended Particulates (TSP) monitoring and site audits are recommended to check that the recommended mitigation measures are properly implemented.
- 3.2 In this section, the requirements, methodology, equipments, monitoring locations and criteria for the monitoring and audit of air quality impact during the construction phase of the Project are presented.

Construction Phase

Monitoring Parameters and Equipment

- 3.3 24-hour TSP levels should be measured to indicate the impacts of construction dust on air quality, whilst, 1-hour TSP monitoring should be conducted only when documented complaint was received. The TSP levels should be measured by following the standard method as set out in High Volume Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA (hereinafter referred to as "HVS method").
- 3.4 All relevant data including temperature, pressure, weather conditions, elapsed-time meter reading for the start and stop of sampler, identification and weight of the filter paper, and other special phenomena and work progress of the concerned site, etc, should be recorded down in detail. A sample data sheet is shown in [Appendix B1](#).
- 3.5 HVS in compliance with the following specifications should be used for carrying out the 1-hour and 24-hour monitoring for TSP levels:
- (i) 0.6 - 1.7 m³ per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
 - (ii) equipped with a timing / control device with ± 5 minutes accuracy for 24 hours operation;
 - (iii) installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
 - (iv) capable of providing a minimum exposed area of 406 cm² (63 inch²);
 - (v) flow control accuracy: $\pm 2.5\%$ deviation over 24-hour sampling period;
 - (vi) incorporated with an electronic mass flow rate controller or other equivalent devices;
 - (vii) equipped with a shelter to protect the filter and sampler;
 - (viii) equipped with a flow recorder for continuous monitoring;
 - (ix) provided with a peaked roof inlet;
 - (x) incorporated with a manometer;
 - (xi) capable of hold and seal the filter paper to the sampler housing at horizontal position;
 - (xii) easy to change the filter; and
 - (xiii) capable of operating continuously for 24-hour periods.
- 3.6 The ET shall be responsible for the provision of the monitoring equipment and should provide sufficient number of HVSs or direct reading dust meters with appropriate calibration kit for carrying out the baseline, regular impacts monitoring and ad-hoc monitoring. The HVSs should be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals, in accordance with requirements stated in the manufacturers operating manual and as described below. If direct reading dust meters is proposed to be used, the ET Leader should submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that the HVS and may be used for the 1-hour sampling. The instrument should also be calibrated regularly. All the equipment, calibration kit, filter papers, etc, should be clearly labelled.
- 3.7 Initial calibration of HVSs with mass flow controller should be conducted upon installation and thereafter every six months. The transfer standard shall be traceable to the internationally recognised primary standard and be calibrated annually. The calibration data should be properly documented for future reference by the IEC.

- 3.8 The flow rates of the sampler before and after the sampling exercise with the filter in position should be verified to be constant and be recorded on the data sheet as shown in [Appendix B1](#).
- 3.9 If the ET Leader proposes alternative dust monitoring equipment / methodology (e.g. direct reading methods) after the approval of this Manual, agreement from the IEC should be sought. The instrument should also be calibrated regularly following the requirements specified by the equipment manufacturers.
- 3.10 Wind data monitoring equipment should also be provided and set up for logging wind speed and wind direction near the dust monitoring locations. The equipment installation location should be proposed by the ET and agreed with the IEC. For installation and operation of wind data monitoring equipment, the following points should be observed:
- (i) The wind sensors should be installed 10m above ground so that they are clear of obstructions or turbulence caused by buildings.
 - (ii) The wind data should be captured by a data logger. The data should be downloaded for analysis at least once a month.
 - (iii) The wind data monitoring equipment should be re-calibrated at least once every six months.
 - (iv) Wind direction should be divided into 16 sectors of 22.5 degrees each.
- 3.11 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IEC.

Laboratory Measurement / Analysis

- 3.12 A clean laboratory with constant temperature and humidity control, and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, should be available for sample analysis, and equipment calibration and maintenance. The laboratory should be HOKLAS accredited.
- 3.13 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 in consultation with the IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IEC. IEC shall conduct regular audit to the measurement performed by the laboratory to ensure the accuracy of measurement results. The ET Leader shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B for his reference.
- 3.14 Filter paper of size 8" x 10" should be labeled before sampling. It should be a clean filter paper with no pinholes, and should be conditioned in a humidity-controlled chamber for over 24-hours and be pre-weighed before use for the sampling.
- 3.15 After sampling, the filter paper loaded with dust should be kept in a clean and tightly sealed plastic bag. The filter paper should then be returned to the laboratory for reconditioning in the humidity-controlled chamber followed by accurate weighing by an electronic balance with readout down to 0.1 mg. The balance should be regularly calibrated against a traceable standard.
- 3.16 All the collected samples should be kept in a good condition for 6 months before disposal.

Dust Monitoring Stations

- 3.17 The worst potentially affected locations in the vicinity of the construction activities of the Project identified for dust monitoring are listed in [Table 3.1](#) and shown in [Figure No. NEX2213/C/361/ENS/M62/510](#).

Table 3.1 Construction Dust Monitoring Stations

Identification No.	Air Sensitive Receiver (ASR) ID in EIA Report	Dust Monitoring Station
AM1	HHA2	Wing Fung Building ^[1]
AM2	HHA9	Harbourfront Horizon ^[2]

Remarks:

- (1) The set up of the dust monitoring station at Wing Fung Building and the subsequent monitoring would be carried out by SCL (TAW-HUH) project.
 - (2) The set up of the dust monitoring station at Harbourfront Horizon and the monitoring would be carried out by KTE project. Upon termination of their EM&A programme, the monitoring works would be taken up by this Project.
- 3.18 The status and locations of air quality sensitive receivers (ASRs) may change after approval of this Manual. In such case, the ET Leader should propose alternative dust monitoring stations and seek agreement from the IEC and EPD.
- 3.19 If alternative monitoring stations are proposed under the situation mentioned above, these stations should be chosen based on the following criteria:
- (i) Monitoring at ASRs close to the major site activities of the Project which are likely to cause air quality impacts;
 - (ii) Monitoring as close as possible to the ASRs as defined in the EIAO-TM; and
 - (iii) Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring.
- 3.20 When positioning the HVSSs, the following points should be noted:
- (i) A horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
 - (ii) Two samplers should not be placed less than 2m apart;
 - (iii) The distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
 - (iv) A minimum of 2m separation from walls, parapets and penthouses is required for rooftops samplers;
 - (v) A minimum of 2m separation from any supporting structures measured horizontally is required;
 - (vi) No furnace or incinerator flue is located nearby the samplers;
 - (vii) Airflow around the sampler is unrestricted;
 - (viii) The sampler is more than 20m from the dripline;
 - (ix) Any wire fence and gate to protect the sampler should not cause any obstruction during monitoring;
 - (x) Permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
 - (xi) A secured supply of electricity is needed to operate the samplers.
- 3.21 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 should be agreed with EPD prior to commencement of baseline monitoring.

Baseline Monitoring

- 3.22 Baseline monitoring should be carried out to determine the ambient 1-hour and 24-hour TSP levels at the monitoring stations prior to the commencement of the Project works. Before commencing the baseline monitoring, the ET leader should inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.
- 3.23 TSP baseline monitoring should be carried out for a continuous period of at least two weeks with the 24-hour and three sets of 1-hour ambient measurements taken daily at each monitoring station. During the baseline monitoring, there should not be any construction or dust generating activities in the vicinity of the monitoring stations. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should also be recorded throughout the baseline monitoring period. A summary of baseline monitoring is presented in

Table 3.2.

- 3.24 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader should liaise with the EPD to agree on an appropriate set of data to be used as a baseline reference. A summary of baseline monitoring is presented in [Table 3.2](#).
- 3.25 The baseline monitoring will provide data for the determination of the appropriate Action levels whilst the Limit levels will be set against statutory or otherwise agreed limits.
- 3.26 If the ET Leader considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels and air quality criteria, after consultation and agreement with the ER, the IEC and the EPD.

Impact Monitoring

- 3.27 The monthly schedule of the impact monitoring programme should be drawn up by the ET one month prior to the commencement of the scheduled construction period.
- 3.28 For the regular 24-hour TSP impact monitoring, a sampling frequency of at least once in every six days should be strictly observed at the monitoring stations when there are Project related construction activities being undertaken within a radius of 500m from these monitoring stations. The specific time to start and stop the 24-hour TSP monitoring should be clearly defined for each location and be strictly followed the field operator. 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. In case non-compliance with the air quality criteria, more frequent monitoring, as specified in the Action Plan in the following section, should be conducted. This additional monitoring should be continued until the excessive dust emission or the deterioration in the air quality is rectified. The impact monitoring programme is summarised in [Table 3.2](#).

Table 3.2 Summary of Construction Dust Monitoring Programme

Monitoring Period	Duration	Sampling Parameter	Frequency
Baseline Monitoring	Consecutive days of at least 2 weeks before commencement of major construction works	1 hour TSP	<ul style="list-style-type: none"> 3 times per day
		24-hour TSP	<ul style="list-style-type: none"> Daily
Impact Monitoring	Throughout the construction phase*	1 hour TSP [#]	<ul style="list-style-type: none"> 3 times in every 6 days when documented and valid complaint was received
		24-hour TSP*	<ul style="list-style-type: none"> Once in every 6 days

* Impact monitoring should be conducted at the monitoring stations for 24-hour TSP monitoring when there are Project related construction activities being undertaken within a radius of 500m from these monitoring stations.

[#] 1-hour TSP monitoring should be conducted only when documented and valid complaint was received.

- 3.29 Before commencement of the monitoring, the ET should inform the IEC of the impact monitoring programme such that the IEC can conduct an on-site audit to ensure the accuracy of the impact monitoring results.

Compliance Assessment

- 3.30 Action and Limit (A/L) levels that provide an appropriate framework for the interpretation of monitoring results. The air quality monitoring data should be checked against the recommended A/L levels as listed in [Table 3.3](#).

Table 3.3 Proposed Action and Limit Levels for Construction Dust Impact Monitoring

Parameter	Action Level ⁽¹⁾	Limit Level
24- hours TSP	<ul style="list-style-type: none"> For $BL \leq 200 \mu\text{g m}^{-3}$, $AL = (BL * 1.3 + LL)/2$ For $BL > 200 \mu\text{g m}^{-3}$, $AL = LL$ 	$260 \mu\text{g m}^{-3}$

1-hour TSP	<ul style="list-style-type: none"> • For $BL \leq 384\mu\text{g m}^{-3}$, $AL = (BL * 1.3 + LL)/2$ • For $BL > 384\mu\text{g m}^{-3}$, $AL = LL$ 	500 $\mu\text{g m}^{-3}$
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(1) BL = Baseline level, AL = Action level, LL = Limit level.

Event and Action Plan

3.31 The Event and Action Plan prescribes procedures and actions associated with the outcome of the comparison of air quality monitoring data recorded and the agreed A/L levels. In the cases where exceedances of these A/L levels occur, the ET, the IEC, the ER and the Contractor should strictly observe the relevant actions of the respective Event and Action Plan listed in [Table 3.4](#).

Table 3.4 Event and Action Plan for Construction Dust Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Inform the Contractor, IEC and ER; 2. Discuss with the Contractor on the remedial measures required; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing. 	<ol style="list-style-type: none"> 1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; 3. Amend working methods agreed with the ER as appropriate.
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Inform the Contractor, IEC and ER; 2. Discuss with the ER and Contractor on the remedial measures required; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency to daily; 5. If exceedance continues, arrange meeting with the IEC, ER and Contractor; 6. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Review and agree on the remedial measures proposed by the Contractor; 3. Supervise Implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; 4. Amend proposal as appropriate.
LIMIT LEVEL				
1. Exceedance for one sample	<ol style="list-style-type: none"> 1. Inform the Contractor, IEC, EPD and ER; 2. Repeat measurement to confirm findings; 3. Increase monitoring frequency to 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ET, ER and 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Review and agree on the remedial measures 	<ol style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
	<p>daily;</p> <p>4. Discuss with the ER, IEC and contractor on the remedial measures and assess the effectiveness.</p>	<p>Contractor on possible remedial measures;</p> <p>4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures. .</p>	<p>proposed by the Contractor;</p> <p>3. Supervise implementation of remedial measures.</p>	<p>exceedance;</p> <p>3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification;</p> <p>4. Implement the agreed proposals;</p> <p>5. Amend proposal if appropriate.</p>
<p>2. Exceedance for two or more consecutive samples</p>	<p>1. Notify Contractor, IEC, EPD and ER ;</p> <p>2. Repeat measurement to confirm findings;</p> <p>3. Increase monitoring frequency to daily;</p> <p>4. Carry out analysis of the Contractor's working procedures with the ER to determine possible mitigation to be implemented;</p> <p>5. Arrange meeting with the IEC and ER to discuss the remedial measures to be taken;</p> <p>6. Review the effectiveness of the Contractor's remedial measures and keep IEC, EPD and ER informed of the results;</p> <p>7. If exceedance stops, cease additional monitoring.</p>	<p>1. Check monitoring data submitted by the ET;</p> <p>2. Check the Contractor's working method;</p> <p>3. Discuss with ET, ER, and Contractor on the potential remedial measures;</p> <p>4. Review and advise the ER and ET on the effectiveness of Contractor's remedial measures.</p>	<p>1. Confirm receipt of notification of exceedance in writing;</p> <p>2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented;</p> <p>3. Supervise the implementation of remedial measures;</p> <p>4. 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.</p>	<p>1. Identify source(s) and investigate the causes of exceedance;</p> <p>2. Take immediate action to avoid further exceedance;</p> <p>3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification;</p> <p>4. Implement the agreed proposals;</p> <p>5. Revise and resubmit proposals if problem still not under control;</p> <p>6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.</p>

Operation Phase

- 3.32 As identified in the EIA Report, there would be no adverse air quality impact anticipated from the operation of the Project as the scheduled trains will be electrically operated. In terms of the Intercity and freight trains and maintenance locomotives, the mode of operation and frequency are the same as the prevailing condition, and no adverse air quality would be expected. Therefore, no specific environmental monitoring and audit requirements are required during operation phase.

Mitigation Measures

- 3.33 Site specific dust mitigation measures recommended in the EIA Report include watering on active works areas, exposed areas and paved haul roads, enclosing the unloading process at barging point, good site practices and dust suppression measures stipulated in Air Pollution Control (Construction Dust) Regulation.
- 3.34 Other site-specific mitigation measures recommended in the EIA Report are presented in [Appendix A](#).

4. AIRBORNE NOISE

Introduction

- 4.1 In this section, the requirements, methodology, equipment, monitoring locations and protocols for the monitoring and audit of airborne noise impacts during the construction and operation phases of the Project are presented.

Construction Noise

Noise Parameters

- 4.2 The construction noise level should be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq(30\text{ minutes})}$ should be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays.
- 4.3 Supplementary information for data auditing and statistical results such as L_{10} and L_{90} should also be obtained for reference. A sample data record sheet is shown in [Appendix B2](#) for reference.

Monitoring Equipment and Methodology

- 4.4 As referred to the requirements of the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications should be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter should 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 difference between calibration levels obtained before and after the noise measurement is less than 1.0 dB.
- 4.5 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 should be checked with a portable wind speed meter capable of measuring wind speeds in ms^{-1} .
- 4.6 The ET is responsible for the provision of the monitoring equipment and should 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 should be clearly labelled.

Noise Monitoring Stations

- 4.7 In accordance with the EIA Report, the designated locations for construction noise monitoring are listed in [Table 4.1](#) and shown in [Figure No. NEX2213/C/361/ENS/M62/520](#).

Table 4.1 Noise Monitoring Stations during Construction Phase

Identification No.	Noise Sensitive Receiver (NSR) ID in EIA Report	Noise Monitoring Station
NM1	OM4a	Carmel Secondary School (South Block)
NM2	HH2	Wing Fung Building ^[1]

Note:

- [1] The set up of the noise monitoring station at Wing Fung Building and the subsequent monitoring would be carried out by SCL (TAW-HUH) project.

- 4.8 The status and location of noise sensitive receivers (NSRs) may change after approval of this Manual. In such case, and if changes to the monitoring locations are considered necessary, the ET Leader should propose updated monitoring stations and seek approval from the ER and agreement from the IEC and EPD on the proposal. If alternative monitoring stations are proposed, these stations should be chosen based on the following criteria:
- Monitoring at NSRs close to the major site activities of the Project that are likely to cause noise impacts;
 - Monitoring as close as possible to the NSRs as defined in the EIAO-TM; and
 - Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring.

- 4.9 The monitoring stations should normally be at a point 1m from the exterior of the noise sensitive facade and be at a position 1.2m above ground. If there is a problem with access to the normal monitoring position, an alternative position should be chosen, and a correction to the measurement results should be made. For reference, a correction of +3dB(A) should be made to free-field measurements. The ET Leader should agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring should be carried out at the same positions. If changes to the monitoring stations are required upon commencing the baseline monitoring or thereafter, the ET should propose alternative locations based on the above-mentioned criteria and seek approval from the ER and agreement from the IEC and EPD on the proposal.

Baseline Monitoring

- 4.10 The ET should carry out baseline noise monitoring prior to the commencement of the construction works. The baseline noise levels should be measured for a continuous period of at least 14 consecutive days at a minimum logging interval of 30 minutes for daytime (between 0700 and 1900 hours of normal weekdays) and 15 minutes (as three consecutive $L_{eq, (5 \text{ minutes})}$ readings) for evening time (between 1900 and 2300 hours on normal weekdays), general holidays including Sundays (between 0700 and 2300 hours) and night-time (between 2300 and 0700 on all days). The L_{eq} , L_{10} and L_{90} should be recorded at the specified interval. Before commencing the baseline monitoring the ET leader should inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.
- 4.11 There should not be any construction activities in the vicinity of the monitoring stations during the baseline monitoring. Any non-project related construction activities in the vicinity of the monitoring stations during the baseline monitoring should be noted and the source and location of such activities should be recorded.
- 4.12 In exceptional cases, when baseline monitoring data obtained are insufficient or questionable, the ET Leader should liaise with the IEC and EPD to agree on an appropriate set of data to be used as the baseline reference.

Impact Monitoring

- 4.13 Noise monitoring should be carried out at all the designated monitoring stations when there are Project-related construction activities being undertaken within a radius of 300m from the monitoring stations. The monitoring frequency should depend on the scale of the construction activities. An initial guide on the monitoring is to obtain one set of 30-minute measurement at each station between 0700 and 1900 hours on normal weekdays at a frequency of once a week when construction activities are underway.
- 4.14 If a school is located near the construction activities, noise monitoring should be carried out at the monitoring stations for the school during school examination periods. The ET Leader should liaise with the school administration and the Hong Kong Examinations and Assessment Authority to ascertain the exact dates and times of all examinations during the construction phase of the Project.
- 4.15 In the case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in Event and Action Plan in [Table 4.3](#), should be carried out. This additional monitoring should be continued until the recorded noise levels show that the non-compliance is rectified or proved to be irrelevant to the Project-related construction activities.

Event and Action Plan

- 4.16 The Action and Limit levels for construction noise are defined in [Table 4.2](#). Should non-compliance of the noise quality criteria occurs, actions in accordance with the Event and Action Plan in [Table 4.3](#) should be taken.

Table 4.2 Action and Limit Levels for Construction Noise Impact Monitoring

Time Period	Action Level	Limit Level
0700-1900 hours on normal weekdays	When one documented complaint is received	75 dB(A) for residential premises
		70 dB(A) for schools and 65 dB(A) during examination period

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

Table 4.3 Event and Action Plan for Construction Noise Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
Action Level	<ol style="list-style-type: none"> 1. Notify the Contractor, IEC and ER; 2. Discuss with the ER and Contractor on the remedial measures required; and 3. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the investigation results submitted by the contractor; and 2. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of complaint in writing; 2. Review and agree on the remedial measures proposed by the Contractor; and 3. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Investigate the complaint and propose remedial measures; 2. Report the results of investigation to the IEC, ET and ER; 3. Submit noise mitigation proposals to the ER with copy to the IEC and ET within 3 working days of notification; and 4. Implement noise mitigation proposals.
Limit Level	<ol style="list-style-type: none"> 1. Notify the Contractor, IEC, EPD and ER ; 2. Repeat measurement to confirm findings; 3. Increase monitoring frequency; 4. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 5. Arrange meeting with the IEC and ER to discuss the remedial measures to be taken; 6. Review the effectiveness of Contractor's remedial measures and keep IEC, EPD and ER informed of the results; and 7. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ER, ET and Contractor on the potential remedial measures; and 4. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. 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. 	<ol style="list-style-type: none"> 1. Identify source and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with copy to the IEC and ET within 3 working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; and 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

Operation Noise – Rail Operation

Noise Parameters

- 4.18 To ensure compliance of operational airborne rail noise levels with the noise standards stipulated in the NCO, the ET should carry out rail noise monitoring at the potentially worst affected NSRs identified in the EIA Report upon commencement of operation of the Project.

Operation Rail Noise Monitoring

- 4.19 Monitoring of LAeq 30min train noise levels will be carried out at the proposed monitoring locations during night-time period, i.e.2300-0700 on a monthly basis after the entire SCL Hung Hom to Admiralty section is in operation. Background noise levels shall also be measured. It is recommended to conduct the monitoring for the initial start-up of up to 6 months. With full compliance of the noise limit and agreement from IEC, monitoring can be terminated before the end of this 6-month period.

Monitoring Equipment and Methodology

- 4.20 The monitoring equipments and methodology for operation rail noise monitoring should be same as those recommended for construction airborne noise monitoring.

Noise Monitoring Stations

- 4.21 Based on the EIA study, the potentially worst affected locations were designated for operational airborne noise monitoring as listed in [Table 4.4](#) and illustrated in [Figure No. NEX2213/C/361/ENS/M62/521](#).

Table 4.4 Noise Monitoring Stations during Operation Phase

Identification No.	NSR ID in EIA Report	ASR	Operation Noise Monitoring Station
ON1	OM1a	C	Shun Man House, Oi Man Estate
ON2	HH1	C	Wylie Court, Block C

- 4.22 The status and location of noise monitoring stations may change after approval of this Manual. In such cases, and if changes to the monitoring locations are considered necessary, the ET Leader should propose updated monitoring stations and seek agreement from the IEC and EPD on the proposal. If alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria:

- Monitoring at NSRs close to the Project railway which are likely to cause noise impacts;
- Monitoring as close as practicable to the NSRs as defined in the EIAO-TM and IND-TM; and
- Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring.

- 4.23 The monitoring stations should normally be at a point 1m from the exterior of the noise sensitive facade and be at a position 1.2m above ground. If there is a problem with access to the normal monitoring position, an alternative position should be chosen, and a correction to the measurements should be made. For reference, a correction of +3dB(A) should be made to the free field measurements. The ET Leader should agree with the IEC on the monitoring position and the corrections adopted.

Operation Noise – Fixed Plant

Maximum Permissible Sound Power Levels of Fixed Plant

- 4.24 The maximum permissible sound power levels of the identified fixed noise sources of the Project were predicted in the EIA report. To ensure that the noise impact associated with the fixed plant operations would comply with the noise standards stipulated in the EIAO-TM and NCO, the specified sound power levels should be implemented and refined by the Contractor as appropriate. No specific monitoring for the fixed plant operation is deemed necessary.

Mitigation Measures

Construction Phase

- 4.25 The EIA report indicates that construction activities would cause noise exceedances at a few NSRs, and therefore, appropriate mitigation measures and good site practices are recommended. The Contractor should be responsible for the design and implementation of these measures. The implementation schedule for the recommended mitigation measures is presented in [Appendix A](#).
- 4.26 In the event of exceedances or complaints, the Contractor should review the effectiveness of these mitigation measures and propose, design and implement alternative or additional measures as appropriate. The Contractor should liaise with the ET Leader on alternative or additional mitigation measures submit to the ER for approval and implement the mitigation measures.

Operation Phase

- 4.27 The mitigation measures as recommended in the EIA Report for the operation of the Project is presented in [Appendix A](#). These measures should be reviewed and refined by the ER and ET Leader if there are any major design changes during the detailed design phase such that the recommended measures are adequate for alleviating the potential operation rail noise impacts.

5. GROUND-BORNE NOISE

Introduction

5.1 In this section, the requirements for the monitoring and audit of ground-borne noise impacts during the construction and operation phases of the Project are presented.

Construction Ground-borne Noise

5.2 In accordance with the EIA Report, the predicted construction ground-borne noise level at the identified ground-borne NSR would comply with the noise criteria. Adverse ground-borne construction noise impact due to the Project would not be envisaged. Environmental monitoring is thus considered not necessary during construction phase.

Operation Ground-borne Noise

Monitoring Equipment

5.3 According to the requirements of the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651:1979 (Type 1) and 804:1985 (Type 1) specifications should be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement, the accuracy of the sound level meter should 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 difference between the calibration levels obtained before and after the noise measurement is less than 1.0 dB.

Commissioning test

5.4 A commissioning test should be conducted by the ET before the entire SCL Hung Hom to Admiralty section is in operation to check the compliance of the operational ground-borne noise levels with the NCO noise criteria. The ground-borne noise monitoring location should include the critical NSR stated in [Table 5.1](#) and in [Figure NEX2213/C/361/ENS/M62/521](#). The noise commissioning test report should be submitted to the IEC for verification.

Table 5.1 Operation Ground-borne Noise Monitoring Location

Identification No.	NSR ID in EIA Report	Monitoring Location	Uses
GN1	HH2	Wing Fung Building	Residential

5.5 The monitoring location shall normally be at the lowest sensitive floor of each designated monitoring location and normally be at a position 1.2m above ground inside the building structures. It shall also not be significantly affected by background noise level. The exact location for the monitoring shall be proposed by the ET and agreed with IEC and EPD.

5.6 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. The ET shall agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline and the impact monitoring shall be carried out at the same position. If changes to the monitoring stations are required upon commencing the baseline monitoring or thereafter, the ET should propose alternative locations based on the above-mentioned criteria and seek approval from the ER and agreement from the IEC and EPD on the proposal.

Mitigation Measures

Construction Phase

5.7 The predicted construction ground-borne noise at identified NSR would comply with the noise criteria. Mitigation measures are not required.

Operation Phase

5.8 The predicted operational ground-borne noise at all identified NSRs would comply with the noise criteria. Mitigation measures are not required.

6. WATER QUALITY

Introduction

- 6.1 In accordance with the EIA Report, with recommended mitigation measures properly in place, no adverse water quality is expected during the construction and operation phases of the Project and no water quality monitoring is hence proposed. However, regular inspections of the construction activities and works areas should be conducted during the construction phase to ensure proper implementation of the recommended mitigation measures.

Construction Phase

- 6.2 No surface water quality monitoring would be required during the construction phase. To avoid potential water quality impact arising from construction activities, regular site audit should be conducted to ensure the recommended mitigation measures are properly implemented.

Audit Requirements

- 6.3 Implementation of regular site audits is to ensure that the recommended mitigation measures are to be properly undertaken during construction phase of the Project. It can also provide an effective control of any malpractices and therefore achieve continual improvement of environmental performance on site. Site audits should include site inspections and compliance audits.
- 6.4 The requirements of the environmental audit programme are set out in **Section 9** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

Site Inspection

- 6.5 Inspections of the construction activities and works areas should be conducted by the Contractor at least on a weekly basis to ensure that the recommended mitigation measures are properly implemented.
- 6.6 Site audits should be carried out by the ER, ET and Contractor and should be based on the mitigation measures for water pollution control recommended in [Appendix A](#). In the event that the recommended mitigation measures are not fully or properly implemented, the Contractor should record the deficiency and report to the ER and ET. Suitable actions are to be carried out by the Contractor to:
- investigate the problems and the causes;
 - discuss a remedial and corrective proposal with the ER and ET;
 - take action according to action notes agreed with the ER;
 - implement remedial and corrective actions immediately;
 - re-inspect the site conditions upon completion of the remedial and corrective actions; and
 - record the event and discuss with the ER and ET for preventive actions.

Compliance Audits

- 6.7 Compliance audits are to be undertaken by the ER and ET to ensure that a valid discharge license has been issued by the EPD prior to the discharge of effluent from the construction activities of the Project site. If monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project, the monitoring should be carried out in accordance with the *Water Pollution Control Ordinance (WPCO)* license which is under the ambit of the regional office (RO) of EPD. The audit results reflect whether the effluent quality is in compliance with the discharge license requirements. In case of non-compliance, suitable actions should be undertaken:
- The ET should notify the Contractor, IEC and ER;
 - The Contractor should identify the sources of pollution and recommend the appropriate mitigation measures to be agreed by the ER and ET;
 - The ER and ET should check the implementation status of the agreed mitigation measures;
 - The ER and ET should investigate the operating conditions of the on-site treatment systems;

- The Contractor should implement corrective and remedial actions to improve the effluent quality;
- The ET should increase monitoring frequency until the effluent quality is in compliance with the discharge license requirements; and
- The ET should record the non-compliances and propose preventive measures.

Operation Phase

- 6.8 Water quality monitoring and audit is not required during the operation phase as no adverse water quality impact would be anticipated during the operation phase, provided that all mitigation measures recommended in the EIA Report are properly implemented.

Mitigation Measures

- 6.9 The recommended mitigation measures for water quality impacts during construction stage are presented in the Implementation Schedule in [Appendix A](#).
- 6.10 In the event of complaints, or non-compliance / area of improvement being observed, the ET and Contractor should review the effectiveness of these mitigation measures, design alternative or additional mitigation measures as appropriate and propose to the ER for approval, and implement these alternative or additional measures accordingly.

7. WASTE MANAGEMENT ISSUES

Introduction

- 7.1 Construction and Demolition (C&D) materials, sediment, general refuse from workforce and chemical waste would be generated during the construction phase of the Project. It is the Contractor's responsibility to ensure all the waste arisen from the Project are handled, stored and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines. Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices are strictly followed, adverse environmental impacts would not be expected.
- 7.2 Large quantities of waste are not expected to be generated from the operation of the Project and no adverse environmental impacts will arise with the implementation of good waste management practices. Therefore, an audit programme for the operational phase of the Project will not be required.

Audit Requirements

- 7.3 Regular audits and site inspections should be carried out during construction phase by the ER, ET and Contractor to ensure that the recommended good site practices and mitigation measures in [Appendix A](#) are properly implemented by the Contractor. The audits should concern all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspections, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements.
- 7.4 The requirements of the environmental audit programme are set out in **Section 9** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

Mitigation Measures

Construction Phase

- 7.5 The mitigation measures recommended in the EIA Report should form the basis of the site Waste Management Plan (WMP) to be developed by the Contractor during the construction stage.
- 7.6 It is recommended that the waste materials generated during the construction activities should be audited regularly by the ET to determine if wastes are being managed in accordance with approved procedures and the site WMP. The audit should look at all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements. In addition, the routine site inspections should check the implementation of the recommended good site practices and other waste management mitigation measures.
- 7.7 With the appropriate handling, storage and disposal of waste arising from the construction works as recommended in [Appendix A](#), the potential of adverse environmental impacts would be minimized. During the site inspections, the ET should pay special attention to the issues relating to the waste management and check whether the Contractor has implemented the recommended good site practices and mitigation measures.

Operation Phase

- 7.8 The anticipated volume of waste generation in operation phase is insignificant. But mitigation measures as recommended in [Appendix A](#) are implemented for the identified waste types in order to minimise the potential impacts to the environment.

8. LAND CONTAMINATION ISSUE

8.1 The land contamination assessment has examined the potential contaminating land uses within the Project area and investigated the potential impacts of the contamination on future use. Based on the findings from the Stage 1, Post-Stage 1 and Stage 2 site investigation (SI), no adverse impacts have been identified within the Project area. No specific EM&A requirement is therefore required. Precautionary measures are proposed for the excavation of soil, treatment of soil and general environmental impacts, together with health and safety measures on site during the construction stage.

8.2 With implementation of recommendations for land contamination in the EIA Report, specific EM&A requirement is not required.

Mitigation Measures

8.3 Mitigation measures for land contamination have been recommended in the EIA Report. The Contractor should be responsible for the implementation of these measures. The implementation schedule of the recommended land contamination mitigation measures is presented in [Appendix A](#).

9. ENVIRONMENTAL AUDITING

Site Inspection

- 9.1 Site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area by providing a direct mean to trigger and enforce specified environmental protection and pollution control measures. Site inspections should be undertaken regularly during the construction phase to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented for the activities associated with the Project.
- 9.2 The ET should be responsible for formulating the environmental site inspection programme as well as the deficiency and remedial action reporting system, and for carrying out the site inspections. The proposal for rectification, if any, should be prepared and submitted to the ET Leader and IEC by the Contractor.
- 9.3 Regular site inspections should be carried out and led by the ER and attended by the Contractor and ET at least once per week during the construction phase. The areas of inspection should not be limited to the environmental conditions and the pollution control and mitigation measures within the works areas. It should also review the environmental conditions of locations that are beyond the boundary of the works areas but are likely to be affected directly or indirectly by the construction site activities of the Project. During the inspection, the following information should be referred to:
- The EIA report and EM&A Manual recommendations on environmental protection and pollution control mitigation measures;
 - Ongoing results of the EM&A programme;
 - Works progress and programme;
 - Individual works methodology proposals (which should include the proposal on associated pollution control measures);
 - Contract specifications on environmental protection and pollution prevention control;
 - Relevant environmental protection and pollution control legislations; and
 - Previous site inspection results undertaken by the ET and others.
- 9.4 The Contractor should keep the ER and ET Leader updated with all relevant environmental related information on the construction contract necessary for him/her to carry out the site inspections. Site inspection results and associated recommendations for improvements to the environmental protection and pollution control efforts should be recorded and followed up by the Contractor in an agreed time-frame. The Contractor should follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and remedial action reporting system to be formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.
- 9.5 The ER, ET and the Contractor should also carry out ad hoc site inspections 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 Event and Action Plan for the EM&A programme.

Environmental Compliance

- 9.6 There are statutory requirements on environmental protection and pollution control, with which construction activities must comply.
- 9.7 To ensure the works are in compliance with all method statements of works should be submitted by the Contractor to the ER for approval and to the ET Leader to determine if sufficient environmental protection and pollution control measures have been included. The implementation schedule of mitigation measures is summarized in [Appendix A](#). Any proposed changes to the mitigation measures shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report.
- 9.8 The ER and ET Leader should also review the progress and programme of the works to check that relevant environmental legislations have not been violated, and that any foreseeable potential for violating laws can be prevented.

- 9.9 The Contractor should provide the update of the relevant documents to the ET Leader so that works checking could be carried out effectively. The document should at least include the updated Works Progress Reports, updated Works Programme, method statements, any application letters for licences / permits under the environmental protection legislations, and copies of all valid licences / permits. The site diary and environmental records should also be available for the inspection by the relevant parties.
- 9.10 After reviewing the documentation, the ET Leader should advise the Contractor of any non-compliance with legislative requirements on environmental protection and pollution control so that they can timely take follow-up actions as appropriate. If the follow-up actions may still result in violation of environmental protection and pollution control requirements, the ER and ET should provide further advice to the Contractor to take remedial action to resolve the problem.
- 9.11 Upon receipt of the advice, the Contractor should undertake immediate action to remedy the situation. The ER and ET should follow up to ensure that appropriate action has been taken in order to satisfy legal requirements.

Choice of Construction Method

- 9.12 At times during the construction phase the Contractor may submit method statements for various aspects of construction. This state of affairs would only apply to those construction methods that the EIA has not imposed conditions while for construction methods that have been assessed in the EIA, the Contractor is bound to follow the requirements and recommendations in the EIA study. The Contractor's options for alternative construction methods may introduce adverse environmental impacts into the Project. It is the responsibility of the Contractor and ET, in accordance with established standards, guidelines and EIA study recommendations and requirements, to review and determine the adequacy of the environmental protection and pollution control measures in the Contractor's proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ET shall provide a copy of the Proactive Environmental Protection Proforma as shown in [Appendix B3](#) to the IEC for approval. The IEC should audit the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

Environmental Complaints

- 9.12 The following procedures should be undertaken upon receipt of any environmental complaint:
- i. The Contractor to log complaint and date of receipt onto the complaint database and inform the ER, ET and IEC immediately;
 - ii. The Contractor to investigate, with the ER and ET, the complaint to determine its validity, and assess whether the source of the problem is due to construction works of the Project with the support of additional monitoring frequency and stations, if necessary;
 - iii. The Contractor to identify remedial measures in consultation with the IEC, ET and ER if a complaint is valid and due to the construction works of the Project;
 - iv. The Contractor to implement the remedial measures by the ER and to agree with the ET and IEC any additional monitoring frequency and stations, where necessary, for checking the effectiveness of the remedial measures;
 - v. The ER, ET and IEC to review the effectiveness of the Contractor's mitigation measures, and the updated situation;
 - vi. The ET/Contractor to undertake additional monitoring and audit to verify the situation if necessary, and oversee that circumstances leading to the complaint do not recur;
 - vii. If the complaint is referred by the EPD, the Contractor to prepare interim report on the status of the complaint investigation and follow-up action stipulated above, including the details of the remedial measures and additional monitoring identified or already taken, for submission to EPD within the time frame assigned by the EPD; and
 - viii. The ET to record the details of the complaint, results of the investigation, subsequent actions taken to address the complaint and updated situation including the effectiveness of the remedial measures, supported by regular and additional monitoring results in the monthly EM&A reports.

10. REPORTING

Introduction

- 10.1 Types of reports that the ET should prepare and submit include Baseline Monitoring Report, Monthly EM&A Reports and Final EM&A Review Report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final review EM&A reports should be made available to the Director of Environmental Protection.
- 10.2 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. All the monitoring data (baseline and impact) should be submitted in electronic medium. Sample data sheets for noise and air quality monitoring are shown in [Appendix B](#).

Baseline Monitoring Report

- 10.3 The ET should prepare and submit a Baseline Environmental Monitoring Report at least one month before commencement of construction of the Project. Copies of the Baseline Environmental Monitoring Report should be submitted to the IEC, ER and EPD. The ET should liaise with the relevant parties on the exact number of copies required.
- 10.4 The Baseline Monitoring Report should include at least the following information:
- (i) up to half a page of executive summary;
 - (ii) brief description of project background information;
 - (iii) drawings showing locations of the baseline monitoring stations;
 - (iv) 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 (and depth)
 - monitoring date, time, frequency and duration
 - QA/QC results and detection limits
 - (v) details of influencing factors, including:
 - major activities, if any, being carried out on the Project sites during the period
 - weather conditions during the period
 - other factors which might affect the monitoring results
 - (vi) determination of the Action and Limit Levels (A/L levels) for each monitoring parameter and statistical analysis of the baseline data;
 - (vii) revisions for inclusion in the EM&A Manual; and
 - (viii) comments and conclusions.

Monthly EM&A Reports

- 10.5 The results and findings of all EM&A works required in this Manual should be recorded in the monthly EM&A reports prepared by the ET and endorsed by the IEC. The first Monthly EM&A Report should be prepared and submitted to EPD within a month after the major construction works commences with the subsequent Monthly EM&A Reports due in 10 working days of the end of each reporting month. Copies of each monthly EM&A report should be submitted to each of the three parties: ER, IEC and EPD. Before submission of the first monthly EM&A Report, the ET should liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic copies.
- 10.6 The ET Leader should review the number and location of monitoring stations and parameters every six months, or on as-needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

First Monthly EM&A Report

- 10.7 The first Monthly EM&A Report should include at least but not limited to the following information:
- (i) executive summary (1-2 pages):
 - breaches of Action and Limit levels;
 - complaint log;
 - notifications of any summons and successful prosecutions;
 - reporting changes; and
 - future key issues.
 - (ii) basic project Information:
 - project organization including key personnel contact names and telephone numbers;
 - construction programme;
 - management structure; and
 - works undertaken during the reporting month.
 - (iii) environmental status:
 - advice on the status of statutory environmental compliance such as the status of compliance with the environmental permit (EP) conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;
 - works undertaken during the reporting month with illustrations (e.g. location of works, etc); and
 - drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
 - (iv) summary of EM&A requirements:
 - all monitoring parameters;
 - environmental quality performance limits (Action and Limit levels);
 - Event and Action Plans;
 - environmental mitigation measures, as recommended in the EIA report; and
 - environmental requirements in contract documents.
 - (v) Implementation status:
 - advice on the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA Report.
 - (vi) monitoring results (in both hard and diskette copies) together with the following information:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - monitoring parameters;
 - monitoring locations;
 - monitoring date, time, frequency and duration;
 - graphical plots of the monitoring parameters in the reporting month annotated against the following:
 - (a) major activities being carried out on site during the reporting period;
 - (b) weather conditions during the reporting period;
 - (c) any other factors which might affect the monitoring results; and
 - (d) QA/QC results and detection limits.
 - (vii) report on non-compliance, complaints, notifications of summons and status of prosecutions:
 - record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - record of all complaints received (written or verbal), including locations and nature of

complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;

- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(viii) Others:

- an account of the future key issues as reviewed from the works programme and method statements of works;
- advice on the solid and liquid waste management status;
- a forecast of the works programme, impact predictions and monitoring schedule for the next three months,
- compare the EM&A data in the reporting month with the EIA predictions and annotate with explanation for any discrepancies;
- record of any project changes from that originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc); and
- comments (for example, the effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

Subsequent Monthly EM&A Reports

10.8 Subsequent monthly EM&A Reports during the construction phase should include the following information:

(i) executive summary (1-2 pages):

- breaches of Action and Limit levels;
- complaint log;
- notifications of any summons and successful prosecutions;
- reporting changes; and
- future key issues.

(ii) basic project Information:

- project organization including key personnel contact names and telephone numbers;
- construction programme;
- management structure;
- works undertaken during the reporting month; and
- any updated as needed to the scope of works and construction methodologies.

(iii) environmental status:

- advice on the status of statutory environmental compliance, the status of compliance with the EP conditions under the EIAO, submission status under the EP and implementation status of mitigation measures;
- works undertaken during the reporting month with illustrations (such as location of works, etc); and
- drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(vi) implementation status:

- advice on the implementation status of environmental protection and pollution control / mitigation measures as recommended in the EIA Report.

- (v) monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - monitoring parameters;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and duration;
 - graphical plots of the monitoring parameters in the reporting month annotated against the following:
 - (a) major activities being carried out on site during the reporting period;
 - (b) weather conditions during the reporting period;
 - (c) any other factors which might affect the monitoring results; and
 - (d) QA/QC results and detection limits.
- (vi) report on non-compliance, complaints, notifications of summons and status of prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - record of all complaints received (written or verbal), including the locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - descriptions of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- (vii) others:
- an account of the future key issues as reviewed from the works programme and method statements of works;
 - advice on the solid and liquid waste management status;
 - a forecast of the works programme, impact predictions and monitoring schedule for the next three months.
 - compare the EM&A data in the reporting month with the EIA predictions and annotate with explanation for any discrepancies;
 - record of any project changes from that originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc); and
 - comments (for example, the effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.
- (viii) appendix:
- Action and Limit levels;
 - graphical plots of trends of the monitoring parameters over the past four reporting periods for the representative monitoring stations annotated against the following:
 - (a) major Project activities being carried out on site during the reporting period;
 - (b) weather conditions during the reporting period;
 - (c) any other factors that might affect the monitoring results.
 - monitoring schedule for the present and next reporting period;
 - cumulative statistics on complaints, notifications of summons and successful prosecutions; and

- outstanding issues and deficiencies.

Final EM&A Review Report - Construction Phase

- 10.9 The EM&A programme should be terminated upon the completion of the construction activities that have the potential to result in significant environmental impacts.
- 10.10 Prior to the proposed termination, it may be advisable to consult relevant local communities. The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Engineer and the Project Proponent followed by approval from the Director of Environmental Protection.
- 10.11 The ET Leader should prepare and submit the Final EM&A Report which should contain at least the following information:
- (i) executive summary (1 - 2 pages);
 - (ii) drawings showing the project area, environmental sensitive receivers and locations of the monitoring and control stations;
 - (iii) basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of works undertaken during the course of the Project;
 - (iv) a brief summary of EM&A requirements including:
 - environmental mitigation measures, as recommended in the EIA Report;
 - environmental impact hypotheses tested;
 - environmental quality performance limits (Action and Limit levels);
 - all monitoring parameters; and
 - Event and Action Plans;
 - (v) a summary of the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report, summarised in the updated implementation schedule;
 - (vi) graphical plots and the statistical analysis of the trends of monitoring parameters over the course of the project, including the post-project monitoring for all monitoring stations annotated against:
 - the major activities being carried out on site during the reporting period;
 - weather conditions during the reporting period; and
 - any other factors which might affect the monitoring results;
 - (vii) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - (viii) a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;
 - (ix) a description of the actions taken in the event of non-compliance;
 - (x) a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
 - (xi) 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;
 - (xii) a review of the validity of EIA predictions and identification of shortcomings of the recommendations proposed in EIA Report;
 - (xiii) comments (for example, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme); and

- (xiv) recommendations and conclusions (for example, a review of success of the overall EM&A programme to cost-effectively identify deterioration and to initiate prompt effective mitigation action when necessary).

Data Keeping

- 10.12 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the EM&A reporting documents. However, any such document should be properly maintained by the ET and be ready for inspection upon request. All relevant information should be clearly and systematically recorded in the document. Monitoring data should also be recorded in magnetic media form, and the software copy must be available upon request. All documents and data should be kept for at least one year following the completion of the construction phase EM&A for each construction contract.

Real-Time Reporting

- 10.13 A dedicated internet web-site will be set up for reporting the EM&A data for public inspection in real-time. Real-time reporting in this context refers to the posting of monitoring data after it has been through the appropriate processing, QA/QC checking by the ET and validation by the IEC.

Interim Notifications of Environmental Quality Limit Exceedances

- 10.14 With reference to the Event and Action Plans, when the environmental quality performance limits are exceeded and if they are proven to be valid, the ET should immediately notify the IEC and EPD, as appropriate. The notification should be followed up with advice to the IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notification is presented in [Appendix C](#).