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## 1. INTRODUCTION

### 1.1 Background

- 1.1.1 The title of the Project is “Widening of Tsuen Wan Road and the associated junction improvement works” (hereafter referred to as the Project).
- 1.1.2 In 2006, Civil Engineering and Development Department (CEDD) engaged consultants to carry out an Environmental Impact Assessment (EIA) under an Investigation Assignment with the project title “Tsuen Wan Road Bypass, Widening of Tsuen Wan Road between Tsuen Tsing Interchange and Kwai Tsing Interchange, and Associated Junction Improvement Works”. The EIA studied the impacts of the project on noise, air quality, water quality, construction waste, cultural heritage, landfill gas hazard, hazard to life, ecology, visual and landscape on both existing and planned developments during construction and operation stages. The EIA report was approved under the EIA Ordinance in December 2008 (EIA Register No.: AEIAR-124/2008).
- 1.1.3 In 2009, CEDD commissioned a Design and Construction (D&C) Assignment on “Tsuen Wan Bypass, Widening of Tsuen Wan Road between Tsuen Tsing Interchange and Kwai Tsing Interchange, and Associated Junction Improvement Works” (the TWB project) to cater for the anticipated increase in traffic demand arising from the developments in the Northwest New Territories, the commissioning of West Rail and its associated property developments as well as other planned developments in Tsuen Wan. By comparing the results of the traffic survey conducted in 2012 with that conducted in 2006, it was revealed that there was a general decrease in the peak hour traffic volume between 2006 and 2012. Moreover, the projected traffic peak hour flow in 2021 as forecast in the survey conducted in 2012 also demonstrated a drop as compared with the traffic flow in 2006.
- 1.1.4 In view of the foregoing, CEDD concluded that there was still adequate road capacity for Tsuen Wan Road (TWR) by 2021 and there was no imminent need to implement the TWB project by that time. It was then agreed in June 2013 to defer the implementation programme of the TWB project.
- 1.1.5 Since then, Transport Department (TD) conducted traffic counts from 2013 and 2015. The traffic counts revealed a general increase in peak hour traffic in 2013 and 2014 when compared with the findings of CEDD’s traffic survey conducted in 2012, while the peak hour traffic in 2015 remained steady.
- 1.1.6 Highways Department (HyD) subsequently took over the project from CEDD. HyD’s traffic review study on TWR traffic conditions conducted in 2016 revealed that the widening of TWR and improvement of associated junctions were needed to cope with the future traffic demand.
- 1.1.7 On 23 May 2019, HyD commissioned AECOM Asia Co. Ltd. to undertake the assignment of Agreement No. CE 61/2018 (HY) Widening of Tsuen Wan Road, Extension of Existing Vehicular Bridge at Texaco Road and the Associated Junction Improvement Works – Investigation. The purpose of the investigation assignment is to examine and review the Initial Scheme, which was basically formulated under the aforementioned CEDD’s D&C Assignment, develop other feasible build forms / alignment options (other Schemes) for the Project. By comparing and evaluating the Initial Scheme and all other Schemes developed, based upon traffic, environmental and land considerations amongst other factors, the Preferred Scheme will be formulated and taken forward to the detailed design and construction stages of the Project.
- 1.1.8 Since approval of the abovementioned EIA report (EIA Register No.: AEIAR-124/2008) in 2008, there are new developments and new sensitive receivers within the study area as well as new assessment requirements for the Project, together with potential changes in project scope, a fresh EIA study is considered required for the Preferred Scheme.

1.1.9 The Project comprises the following which are classified as Designated Project (DP) elements under Part I, Schedule 2 of the EIAO<sup>1</sup>:

- Item A.1 – A road which is an expressway, trunk road, primary distributor or district distributor road including new roads, and major extensions or improvements to existing roads; and
- Item A.8 – A road or railway bridge more than 100 m in length between abutments.

1.1.10 The Project will widen individual road sections of the existing TWR and construct slip road to relieve the existing traffic congestion and cope with the anticipated future traffic demand.

## 1.2 Project Scope and Location

1.2.1 The location of the Project is shown in [Figure 1.1](#). The scope of the Project mainly comprises:

- (i) Widening of a section of an elevated carriageway of TWR between Tai Ho Road and Wing Shun Street, from a three-lane carriageway to a four-lane carriageway on Kowloon bound;
- (ii) Widening of a section of an elevated carriageway of TWR between Wing Shun Street and Wing Kei Road, from a dual two-lane carriageway to a dual three-lane carriageway;
- (iii) Widening of a section of an at-grade carriageway of TWR between Wing Kei Road and KTI, from a dual three-lane carriageway to a dual five-lane carriageway;
- (iv) Widening of a section of an elevated carriageway of TWR between KTI and Container Port Road, from a three-lane carriageway to a four-lane carriageway on Kowloon bound (its implementation is yet to be ascertained and subject to further traffic review);
- (v) Construction of a slip road connecting TWR (Kowloon bound) to Tsing Tsuen Road (Slip Road C) (its implementation is yet to be ascertained and subject to further traffic review);
- (vi) Construction of a slip road connecting TWR (Tuen Mun bound) and Hoi Hing Road (Slip Road E);
- (vii) Provision of noise mitigation measures including noise barriers/enclosures and low noise surfacing materials on associated road sections of Tsuen Wan Road; and
- (viii) Ancillary works including geotechnical, drainage, waterworks, lighting, landscaping works, installation of traffic aid facilities, etc.

## 1.3 Construction Programme

1.3.1 The construction works of the Project will tentatively commence in 2028. Under scenario without Slip Road C, the Project will tentatively complete in 2033. Under scenario with Slip Road C, the Project will tentatively complete in 2036. A tentative construction programme for the Project is provided in [Appendix A](#).

## 1.4 Purpose of this Manual

1.4.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the setups of an EM&A programme to ensure compliance with the 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 for the construction and operation phases of the Project. It aims to provide systematic procedures for monitoring, auditing and minimizing

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<sup>1</sup> Amendment of Schedule 2 of EIAO takes effect since 30 June 2023.  
(<https://www.info.gov.hk/gia/general/202306/30/P2023063000275.htm?fontSize=1>)

environmental impacts associated with construction works and operational activities.

1.4.2 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 EIAO-TM.

1.4.3 This Manual contains the following information:

- Responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), Environmental Team (ET) and Independent Environment Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the Project;
- Project organisation for the EM&A works;
- The basis for, and description of the broad approach underlying the EM&A programme;
- 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; and
- Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures.

1.4.4 For the purpose of this Manual, the ET leader, who shall be responsible for and in charge of the ET, shall refer to the person delegated the role of executing the EM&A requirements.

## 1.5 Project Organization

1.5.1 Involvement of relevant parties in a collaborative and interactive manner is essential for the implementation of the recommended EM&A programme. The following sections outline the primary responsibilities and duties of the key EM&A programme participants. The proposed project organization and lines of communication with respect to EM&A works are shown in [Figure 1.2](#).

### *The Contractor*

1.5.2 The Contractor shall report to the ER. The duties and responsibilities of the Contractor comprise the following:

- Work within the scope of the contract and other tender conditions with respect to environmental requirements;
- Operate and strictly adhere to the guidelines and requirements in this EM&A programme and contract specifications;
- Provide assistance to ET in carrying out monitoring and auditing;
- Participate in the site inspections undertaken by ET as required, and undertake correction actions;
- Provide information / advice to ET regarding works activities which may contribute, or be continuing to the generation of adverse environmental conditions;
- Submit proposals on mitigation measures in case of exceedance of Action and Limit levels in accordance with the Event / Action Plans;
- Implement measures to reduce impact where Action and Limit levels are exceeded; and
- Adhere to the procedures for carrying out complaint investigation.

*Environmental Team (ET)*

- 1.5.3 An ET shall be established before the commencement of construction of the Project. The ET shall be an independent party from the IEC and the Contractor. The ET shall be led and managed by the ET Leader. The ET Leader shall possess at least 7 years of experience in EM&A and/or environmental management. The ET Leader, or an ET Leader representative who shall be a member of the ET with at least 5 years of experience in EM&A or environmental management, shall work full time on-site.
- 1.5.4 The duties and responsibilities of the ET are:
- Monitor various environmental parameters as required in this 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 mitigation measures implemented and the validity of the EIA predictions and to identify any adverse environmental impacts arising;
  - Carry out regular site inspection to investigate and audit the Contractors' site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt problems; carry out ad hoc site inspections if significant environmental problems are identified;
  - Audit and prepare monitoring and audit reports on the environmental monitoring data and site environmental conditions;
  - Report on the environmental monitoring and audit results to the Independent Environmental Checker, Contractor, the ER and EPD or its delegated representative;
  - 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;
  - 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 complaint investigation in accordance with **Section 10.3** of this EM&A Manual.

*Engineer or Engineer's Representative (ER)*

- 1.5.5 The ER is responsible for overseeing the construction works and for ensuring that the works undertaken by the Contractor in accordance with the specification and contractual requirements. The duties and responsibilities of the ER 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 impacts in accordance with the Event and Action Plans;
  - Participate in joint site inspection undertaken by the ET; and
  - Adhere to the procedures for carrying out complaint investigation.

*Independent Environmental Checker (IEC)*

- 1.5.6 An IEC shall be employed before commencement of construction of the Project. Appointment of IEC shall be approved by EPD. The IEC shall be an independent party from the Contractor and the ET and possess at least 7 years' experience in EM&A and/or environmental management. The IEC shall report directly to the EPD on matters relating to the EM&A programme and environmental impacts from the Project. The IEC, or an IEC representative who shall be a person with at least 5 years of experience in EM&A or environmental management shall work full time on-site. The duties and responsibilities of the IEC are:
- Review the EM&A works performed by the ET (at least at monthly intervals);

- Carry out random sample check and audit the monitoring activities and results (at least at monthly intervals);
- Conduct random site inspection;
- Review the EM&A reports submitted by the ET;
- Review the effectiveness of environmental mitigation measures and project environmental performance;
- Review the proposal on mitigation measures submitted by the Contractor in accordance with the Event and Action Plans;
- Check the mitigation measures that have been recommended in the EIA and this Manual, and ensure they are properly implemented in a timely manner, when necessary; and
- Adhere to the procedures for carrying out complaint investigation.

1.5.7 Sufficient and suitably qualified professional and technical staff shall be employed by the respective parties to ensure full compliance with their duties and responsibilities, as required under the EM&A programme for the duration of the Project.

## **1.6 Structure of the EM&A Manual**

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

- Section 2 – Sets out EM&A requirement for air quality;
- Section 3 – Sets out EM&A requirement for noise;
- Section 4 – Sets out EM&A requirement for water quality;
- Section 5 – Sets out EM&A requirement for waste;
- Section 6 – Sets out EM&A requirement for land contamination;
- Section 7 – Sets out EM&A requirement for landfill gas hazard;
- Section 8 – Sets out EM&A requirement for cultural heritage;
- Section 9 – Sets out EM&A requirement for landscape and visual impact;
- Section 10 – Describes scope and frequency of environmental site audits and sets out the general requirements of the EM&A programme; and
- Section 11 – Details the EM&A reporting requirements.



## 2. AIR QUALITY

### 2.1 Introduction

- 2.1.1 Potential air quality impacts arising from the construction and operation phases of the Project on air sensitive receivers (ASRs) were addressed in the EIA Report. The representative ASRs within the assessment area are presented in [Figure 2.1a](#), [Figure 2.1b](#), [Figure 2.1c](#) and [Figure 2.1d](#). With implementation of the recommend control measures, no adverse air quality impact from the project during construction phase would be anticipated. Dust monitoring is proposed to be conducted during construction phase of the Project.
- 2.1.2 Regular site environmental audit is recommended to be conducted during the entire construction phase of the Project so as to ensure the implementation of the proposed dust mitigation measures and the dust suppression measures stipulated in Air Pollution Control (Construction Dust) Regulation as well as regulations mentioned in Sections 3.2.4 – 3.2.7 of EIA Report. Implementation schedule of mitigation measures are presented in [Appendix B](#).
- 2.1.3 No adverse air quality impact would be anticipated during the operation phase of the Project. No operation phase air quality monitoring and audit is therefore considered necessary.
- 2.1.4 This section presents the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of air quality impact during the construction phase of the Project.

### 2.2 Monitoring Parameters

- 2.2.1 The major dusty construction activities of the Project would mainly be related to construction dust from site clearance, demolition of the existing structure, and minor excavation with limited backfilling for column installation and wind erosion of the limited exposed area which would generate dust emissions. Therefore, 1-hour and 24-hour average Respirable Suspended Particulates (RSP) and 24-hour average Fine Suspended Particulates (FSP) are recommended to be monitored continuously and audited at the proposed monitoring locations during construction phase.
- 2.2.2 Monitoring and audit of 1-hour and 24-hour average RSP and 24-hour average FSP levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected, and timely action shall be undertaken to rectify such situation. All relevant data including temperature, relative humidity, pressure, weather conditions, and other special phenomena and work progress of the concerned site, etc., should be recorded down in detail.

### 2.3 Monitoring Equipment

- 2.3.1 The equipment used for continuous RSP and FSP monitoring shall be either FRM (Federal Reference Method)/ FEM (Federal Equivalent Method) or those being calibrated and verified on-site against FRM/FEM. The installation and operating procedures of the proposed instrument shall be followed by the operating manual supplied by the instrument manufacturer. At the later stage, the instrument model shall be proposed by ET and seek approval from IEC. The ET is responsible for the provision, installation, operation, maintenance and dismantling of the instrument. The ET shall strictly follow the operation manual to ensure normal operation of the instrument.
- 2.3.2 The proposed instrument is designated to allow remote monitoring of the system. The ET shall conduct the daily checks on the instrument and PM sampler to ensure normal operation. To ensure that the measurements are of acceptable quality, each sampler should be calibrated regularly. The following describes an on-site calibration protocol that would leave the deployed samplers in place.
- Transfer Standard (TS)
- 2.3.3 A Transfer Standard (TS) is another PM monitor that is at least as capable as the sampler to be calibrated. Another sampler that has just been calibrated may serve the purpose provided its performance is known to be stable during the subsequent collocation period to be used as TS. Right before each on-site calibration, the TS itself needs to be calibrated e.g., collocating with an PM reference monitor such as the FRM or FEM PM monitoring at EPD's Air Quality Monitoring Station (AQMS) or research institutes that has been calibrated against traceable standard. The TS/reference monitor collocation should last as least seven days.

### On-site Calibration

- 2.3.4 The Transfer Standard (TS) should be placed near (<1m if practicable) the sampler to be calibrated so that both devices would be monitoring a similar environment. The TS is then turned on to warm-up for 30-60 minutes. The collocation period starts after the warm-up and TS is then left running with the sampler to be calibrated for at least three hours. The measurements from the sampler to be calibrated and the TS during the collection period will be statistically analyzed.

### Quality Control Criteria

- 2.3.5 The response of the sampler should be adjusted if its performance during on-site calibration does not meet the following evaluation criteria. For each device, data below its detection limit will be excluded.

#### Tier 1: Correlation

- The minute average measurements from the two devices when subject to linear regression should have a coefficient of determination ( $R^2$ )>0.7. The regression line slope should be between 0.75 to 1.25. If these criteria are not met due to narrow range of PM concentration (>30  $\mu\text{g}/\text{m}^3$  and >25  $\mu\text{g}/\text{m}^3$  as recommended span range for RSP and FSP, respectively) during the collocation period, Tier 2 will apply.

#### Tier 2: Root mean squared error

- The root mean squared error of the sampler minute average measurements should be <8  $\mu\text{g}/\text{m}^3$  for RSP and <5  $\mu\text{g}/\text{m}^3$  for FSP.

- 2.3.6 Each deployed sampler should be calibrated every month. If a sampler repeatedly failed in 2 or 3 consecutive calibrations, the sampler should be checked and maintained to improve its performance or it should be replaced.

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

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

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

## 2.4 Monitoring Locations

- 2.4.1 The selected monitoring locations are the worst potentially affected air sensitive receivers located in the vicinity of construction sites. The proposed air quality monitoring locations during construction phase are listed in below. [Figure 2.2a](#), [Figure 2.2b](#), [Figure 2.3a](#), [Figure 2.3b](#), [Figure 2.3c](#), [Figure 2.3d](#), [Figure 2.3e](#), [Figure 2.3f](#), [Figure 2.4a](#), [Figure 2.4b](#), [Figure 2.4c](#), [Figure 2.4d](#), [Figure 2.4e](#) and [Figure 2.4f](#) show the locations of air quality monitoring locations, the general works zones, and the works areas with dusty activities such as slopeworks, demolition of the existing structures, and column installation.

**Table 2-1 Proposed Construction Dust Monitoring Stations**

<b>Monitoring Station ID</b>	<b>EIA ID</b>	<b>Location</b>	<b>Approximate Horizontal Distance between ASRs and the Nearest Road Alignment (m)</b>
AM1	A12	Metropolitan Factory and Warehouse Building	63
AM2	A28b	Salvation Army Ng Kok Wai Memorial Kindergarten	34
AM3	A33	Parc City Tower 3	37
AM4	A36	Ocean Pride Tower 10	39
AM5	A39	Ocean Pride Tower 7	22
AM6	A64	Tsuen Wan Industrial Centre	14
AM7	A97	City Point Block 1	18
AM8	A72	Lin Fung Centre	39
AM9 <sup>[1]</sup>	A102	Lung Shing Factory Building	121
AM10	A75b	Kerry (Tsuen Wan) Warehouse	24
AM11	A115	Citic Telecom Tower	8
AM12	A162	Shui Hing Tannery Factory Ltd	9
AM13 <sup>[1]</sup>	A141	Profit Industrial Building	11
AM14 <sup>[1]</sup>	A85	Riviera Garden Block 20 Hoi Kwai Mansion	30
AM15 <sup>[1]</sup>	A82	Riviera Garden Block 12 Hoi Kwai Mansion	25
AM16	A9	Basketball Court at Hoi On Road Playground	14
AM17	A54	Tsuen Wan Park	18
AM18	A89b	City Point Block 8	31
AM19	A154	Kwai Shun Street Playground	4
AM20	A133	Waford Industrial Building	65
AM21	A125	CNEC Lee I Yao Memorial Secondary School	76
AM22	A78	Wing Kei Road 5-A-Side Soccer Pitch	24
Notes:			
[1] The proposed monitoring station will be considered if the proposed Slip Road C (connecting Tsing Tsuen Road and Tsuen Wan Road) is implemented subject to further traffic review to be conducted upon completion of the "Improvement Works at Tsuen Tsing Interchange" tentatively in 2026.			

- 2.4.2 The status and locations of the air sensitive receivers may change after issuing this Manual. In such case, the ET shall propose updated monitoring locations and seek approval from ER and IEC and agreement from EPD on the proposal.
- 2.4.3 When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:
- i. at the site boundary or such locations close to the major dust emission source;
  - ii. close to the air sensitive receivers as defined in the EIAO-TM;
  - iii. proper position/sitting and orientation of the monitoring equipment; and
  - iv. take into account the prevailing meteorological conditions.
- 2.4.4 The ET shall agree with the IEC on the position of the instrument. When positioning the instrument, the following points shall be noted:
- i. a horizontal platform with appropriate support to secure the instrument against gusty wind shall be provided;
  - ii. general housekeeping, cleaning works and other preventative maintenance activities such as checking the operating status of individual monitoring equipment should be carried out to ensure the proper operation of the system;
  - iii. to ensure representative sampling, the inlet of the instrument should not be obstructed by nearby objects;
  - iv. any wire fence and gate, to protect the instrument, shall not cause any obstruction during monitoring;
  - v. no furnace or incinerator flue is nearby;
  - vi. airflow around the instrument is unrestricted;
  - vii. permission must be obtained to set up the instrument and to obtain access to the monitoring stations; and
  - viii. a secured supply of electricity is needed to operate the samplers.

## 2.5 Impact Monitoring

- 2.5.1 The ET shall carry out impact monitoring during construction phase of the Project. For 1-hour and 24-hour average RSP, and 24-hour average FSP monitoring, continuous monitoring of hourly data should be undertaken. In case of non-compliance with the air criteria, a series of actions, specified in the Action Plan in the following section, should be conducted. The impact monitoring programme is summarized in **Table 2-2**.
- 2.5.2 The monthly schedule of the compliance and impact monitoring programme should be drawn up by the ET one month prior to the commencement of the scheduled construction period. Before commencing the impact monitoring, the ET shall inform the IEC of the impact monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the impact monitoring results.

**Table 2-2 Summary of Construction Dust Monitoring Programme**

Monitoring Period	Duration	Sampling Parameter
Impact Monitoring	Throughout the construction phase	1-hour and 24-hour RSP, and 24-hour FSP

## 2.6 Event and Action Plan

- 2.6.1 The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour and 24-hour average RSP, and 24-hour average FSP. **Table 2-3** shows the air quality criteria, namely Action and Limit levels to be used. However, it should be noted that Action and Limit Levels may subject to change based on the prevailing Air Quality Objectives (AQOs) implemented at the time of monitoring. Should non-compliance of the air quality criteria occur, action in accordance with the Action Plan in **Table 2-4** shall be carried out.

**Table 2-3 Action and Limit Levels for Air Quality (Construction Dust)**

<b>Parameter</b>	<b>Action Level</b>	<b>Limit Level</b>
RSP (1 hour average)	150 $\mu\text{gm}^{-3}$	-
24-hour RSP level (rolling average)	-	100 $\mu\text{gm}^{-3}$
24-hour FSP level (rolling average)	-	50 $\mu\text{gm}^{-3}$

**Table 2-4 Event and Action Plan for Air Quality (Construction Dust)**

Event	Action			
	ET	IEC	ER	Contractor
Action level exceedance for one sample	<ol style="list-style-type: none"> <li>1. Notify IEC and ER;</li> <li>2. Check the monitoring data and error messages to confirm if the performance of the monitoring equipment is normal;</li> <li>3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures;</li> <li>4. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET, ER and Contractor on possible remedial measures;</li> <li>4. Advise ER and ET on the effectiveness of the proposed remedial measures;</li> <li>5. Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consultation with IEC and ET, agree with the Contractor on the remedial measures to be implemented;</li> <li>4. Ensure remedial measures are properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify sources of exceedance and discuss with ER, ET and IEC on possible remedial measures;</li> <li>2. Implement remedial measures;</li> <li>3. Amend working methods if appropriate.</li> </ol>
Action level exceedance for two or more consecutive sampling	<ol style="list-style-type: none"> <li>1. Notify IEC and ER;</li> <li>2. Check the monitoring data and the performance of the monitoring equipment (refer to <b>Appendix C</b>);</li> <li>3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures;</li> <li>4. Discuss with IEC and Contractor on possible remedial measures required;</li> <li>5. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops.</li> <li>6. Notify EPD if the exceedance is confirmed to be related to the Project.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method and verify the performance of the monitoring equipment to be checked by ET (refer to <b>Appendix C</b>);</li> <li>3. Discuss with ET and Contractor on possible remedial measures;</li> <li>4. Advise ER and ET on the effectiveness of the proposed remedial measures;</li> <li>5. Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consultation with IEC and ET, agree with the Contractor on the proposal for remedial measures to be implemented;</li> <li>4. Ensure the proposal for remedial measures are properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the sources and discuss with ER, ET and IEC on possible remedial measures;</li> <li>2. Submit a proposal for remedial measures to ER, IEC and ET within 2 working days of notification of exceedance for agreement;</li> <li>3. Implement the agreed proposal;</li> <li>4. Amend proposal if appropriate.</li> </ol>
Limit level exceedance for one 24-hr rolling average RSP concentration record or/and one 24-hr rolling average FSP concentration record	<ol style="list-style-type: none"> <li>1. Notify IEC, ER, Contractor and EPD;</li> <li>2. Check the monitoring data and the performance of the monitoring equipment (refer to <b>Appendix C</b>);</li> <li>3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures;</li> <li>4. Discuss with IEC, ER and Contractor on possible remedial measures required;</li> <li>5. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops.</li> <li>6. Notify EPD if the exceedance is confirmed to be related to the Project.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method; and verify the performance of the monitoring equipment to be checked by ET (refer to <b>Appendix C</b>);</li> <li>3. Discuss with ER, ET and Contractor on the possible remedial measures;</li> <li>4. Advise ER and ET on the effectiveness of the proposed remedial measures;</li> <li>5. Review Contractor's remedial measures whenever necessary to assure their effectiveness and advise ER and ET accordingly;</li> <li>6. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of exceedance in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consultation with the IEC and ET, agree with the Contractor on the proposal for remedial measures to be implemented;</li> <li>4. Ensure the proposal for remedial measures are properly implemented;</li> <li>5. If exceedance continues, identify what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify the sources and discuss with ER, ET and IEC on possible remedial measures;</li> <li>2. Take immediate action to avoid further exceedance;</li> <li>3. Submit a proposal for remedial measures to ER, IEC and ET within 2 working days of notification of exceedance for agreement;</li> <li>4. Implement the agreed proposal;</li> <li>5. Review and resubmit proposals if the problem is still not under control;</li> <li>6. Stop the relevant portion of works as determined by ER until the exceedance is abated.</li> </ol>

## **2.7 Mitigation Measures**

- 2.7.1 Mitigation measures for construction phase air quality impact have been recommended in the EIA Report. All the recommended mitigation measures are detailed in the implementation schedule presented in [Appendix B](#). The Contractor shall be responsible for the design and implementation of these measures.

## **2.8 Audit Requirements**

- 2.8.1 Regular site inspection and audit at least once per week should be conducted during the entire construction phase of the Project to ensure the recommended mitigation measures are properly implemented.

### **3. NOISE**

#### **3.1 Introduction**

- 3.1.1 The EIA has predicted the potential construction noise and operation traffic noise impacts associated with the Project. The representative Noise Sensitive Receivers (NSRs) within the assessment area are presented in [Figure 3.3a](#) and [Figure 3.3b](#).
- 3.1.2 Construction noise mitigation measures would be required to reduce noise levels to the stipulated standard. A noise monitoring and audit programme should be undertaken to confirm such mitigation measures would be implemented properly.
- 3.1.3 For traffic noise impact, mitigation measures including provision of low noise road surfacing, noise barriers and enclosures would need to be implemented along the roadworks within the Project area. Road traffic noise levels should be monitored at representative NSRs, which are in the vicinity of the recommended direct mitigation measures, during the first year after road opening. The purpose of the monitoring is to ascertain that the recommended mitigation measures are effective in reducing the noise levels.
- 3.1.4 In this section, the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of noise impacts during construction phase and operation phase of the Project are presented.

#### **3.2 General Monitoring Requirement and Equipment**

- 3.2.1 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 shall be accepted as valid only if the calibration level from before and after the noise measurement agree to within 1.0 dB.
- 3.2.2 Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.
- 3.2.3 The ET 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. The equipment installation location shall be proposed by the ET Leader and agreed with the IEC and EPD.
- 3.2.4 The noise monitoring station shall normally be at a point 1 m from the exterior of the sensitive receivers building façade and be a position 1.2 m above the ground. If there is a problem with access to the normal monitoring position, an alternative position shall be chosen, and a correction to the measurements shall be made. For reference, a correction of +3 dB(A) shall be made to the free field measurements. 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 monitoring and the impact monitoring shall be carried out at the same positions.

#### **3.3 Monitoring Parameters for Construction Noise**

- 3.3.1 The construction noise levels should be measured in terms of the 30-minute A-weighted equivalent continuous sound pressure level (Leq (30-min)). Leq (30-min) should be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays.
- 3.3.2 Supplementary information for data auditing and statistical results such as L10 and L90 should also be obtained for reference. Sample noise field data sheets are shown in [Appendix D](#) of this Manual for reference. The ET Leader may modify the data record sheet for this EM&A programme but the format of which should be agreed by the IEC.

#### **3.4 Monitoring Locations for Construction Noise**

- 3.4.1 Based on the noise assessment results in the EIA Report, noise exceedances are predicted under the unmitigated scenario, whereas no noise exceedance would be predicted under



the mitigated scenario. [Figure 3.1](#) shows the proposed construction phase noise monitoring stations. Details of the proposed noise monitoring stations are summarized in [Table 3-1](#).

**Table 3-1 Proposed Noise Monitoring Stations during Construction Phase of the Project**

Noise Monitoring Point	EIA ID	Location	Monitoring Period
CM1	SAK2	Salvation Army Ng Kok Wai Memorial Kindergarten	Works at Works Area 1 and 2 during non-restricted hours
CM2	OP10	Ocean Pride Tower 7	Works at Works Area 1 during non-restricted hours
CM3	CP1	City Point Block 1	Works at Works Area 2 during non-restricted hours
CM4 <sup>(1)</sup>	RG12	Hoi Kwai Mansion, Riviera Gardens	Works at Works Area 6 during non-restricted hours

Notes:

(1) Only applies to “with Slip Road C” Option.

3.4.2 The status and locations of NSRs may change after issuing this Manual. If such cases exist, the ET shall propose updated monitoring locations and seek approval from the IEC and agreement from EPD of the proposal.

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

- i. at locations close to the major site activities which are likely to have noise impacts;
- ii. close to the NSRs; and
- iii. for monitoring locations located in the vicinity of the sensitive receivers, care shall be taken to cause minimal disturbance to the occupants during monitoring.

### 3.5 Impact Monitoring for Construction Noise

3.5.1 Construction noise monitoring should be carried out at the designated monitoring station when there are Project-related construction activities being undertaken within a radius of 300 m 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.

3.5.2 If construction works are extended to include works during the hours of 1900 - 0700, and/or percussive piling is be carried out, applicable permits under NCO shall be obtained by the Contractor. The monitoring requirements and conditions stipulated in the permits have to be followed.

3.5.3 In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action Plan in [Table 3-3](#) 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 Construction Noise

3.6.1 The Action and Limit levels for construction noise are defined in [Table 3-2](#). Should non-compliance of the criteria occur, action in accordance with the Action Plan in [Table 3-3](#) shall be carried out.

**Table 3-2 Action and Limit Levels for Construction Noise**

Time Period	Action Level	Limit Level
0700 – 1900 hours on normal weekdays	When one documented complaint is received	75 dB(A)*

Notes:

- If works are to be carried out during restricted hours and/or percussive piling is to be carried out, the monitoring requirements and the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.
- \* 70 dB(A) and 65 dB(A) for schools during normal teaching periods and school examination periods, respectively.

**Table 3-3 Event and Action Plan for Construction Noise**

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

### 3.7 Noise Parameters for Operation Road Traffic Noise

- 3.7.1 The ET should carry out monitoring of road traffic noise after the works under Contract are completed and upon commencement of operation of the Project. The noise monitoring should be carried out during the first year of the operation phase. The road traffic noise during operation of the Project should be measured in terms of the A-weighted equivalent of  $L_{10}$  (1-hr). During the traffic noise measurement, traffic count including traffic volume, percentage of heavy vehicles as defined in Calculation of Road Traffic Noise (CRTN) and traffic speed should also be undertaken concurrently. Supplementary information for data auditing and statistical results such as  $L_{eq}$  and  $L_{90}$  should also be obtained for reference.
- 3.7.2 Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

### 3.8 Monitoring Locations for Operation Road Traffic Noise

- 3.8.1 The representative NSRs identified in the EIA Report are selected as the noise monitoring locations in this EM&A Manual. The traffic noise monitoring locations during operation phase are listed in **Table 3-4** and shown in **Figure 3.2**. The locations for operation noise monitoring shall be defined during detailed design on the basis of the status of the most up-to-date information on proposed developments surrounding the Project.

**Table 3-4 Road Traffic Noise Monitoring Locations**

Monitoring Station ID	NSR ID no. in EIA Report	Location	Proposed Mitigation Measures Nearby
OM1	OP11	Ocean Pride Tower 10	FE1
OM2	TD6	The Dynasty Tower 1	FE1, FE2, SE1
OM3	CP12	City Point Block 8	SE1, N1
OM4 <sup>(1)</sup>	RG5	Hoi Yin Mansion, Riviera Gardens	SE2, SE3, SE4, N2, LNRS1

Notes:

(1) Only applies to "with Slip Road C" Option.

- 3.8.2 The status and locations of NSRs may change after issuing this manual. In this event, the ET Leader shall propose updated monitoring locations and seek approval from IEC and agreement from EPD of the proposal.
- 3.8.3 When alternative monitoring locations are proposed, the monitoring locations should be chosen based on the following criteria in that they should be:
- At locations close to the major site activities which are likely to have noise impacts;
  - Close to the NSRs; and
  - For monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

### 3.9 Impact Monitoring for Operation Road Traffic Noise

- 3.9.1 Traffic noise monitoring shall be carried out at all the designated traffic noise monitoring stations. The following is an initial guide on the traffic noise monitoring requirements during the operation phase:
- One set of measurements at the morning traffic peak hour on normal weekdays;
  - One set of measurements at the evening traffic peak hour on normal weekdays;
  - A concurrent census of traffic flow and percentage heavy vehicle shall be conducted for the Project roads and the existing road network in the vicinity of each measuring point;
  - Average vehicle speed estimated for Project road and the existing road network in the vicinity of each measuring points; and
  - The two sets of monitoring data should be obtained within the first year of operation.
- 3.9.2 The ET should prepare and deposit to EPD, at least 6 months before the operation of the proposed roads under the Project, a monitoring plan for the purpose of assessing the

accuracy of traffic noise predictions by comparing the noise impact predictions with the actual impacts. The monitoring plan should contain monitoring locations, monitoring schedules, methodology of noise monitoring including noise measurement procedures, traffic counts and speed checks, and methodology of comparison with the predicted levels. The ET should implement the monitoring plan in accordance with the deposited monitoring plan unless with prior justifications. Monitoring details and results including the comparison between the measured noise levels and the predicted levels should be recorded in a report to be deposited with EPD within one month of the completion of the monitoring. The report should be certified by the ET Leader and verified by the IEC before deposit with EPD.

- 3.9.3 Measured noise levels should be compared with predicted noise levels by applying appropriate conversion corrections to allow for the traffic conditions at the time of measurement.
- 3.9.4 Each set of measurements shall include three measurements of 30 minutes. The parameters  $L_{10}$ ,  $L_{eq}$ ,  $L_{90}$  and  $L_{max}$  will be recorded for data auditing and reference.

### **3.10 Event and Action Plan for Road Traffic Noise**

- 3.10.1 For traffic noise, the measured /monitored noise levels shall be compared with the predicted results and the predicted traffic flow conditions (calculated noise levels based on concurrent traffic census obtained). In case discrepancies are observed, explanation shall be given to justify the discrepancies and / or propose any recommendation if identified necessary.

### **3.11 Mitigation Measures**

#### Construction Phase

- 3.11.1 To alleviate the construction noise impact on the affected NSRs, use of movable noise barriers for excavator, mobile crane, loader, lorry, saw circular wood, bar bender and cutter (electric), breaker hand-held mass $\leq$ 10kg, concrete lorry mixer, concrete mixer, poker vibratory hand-held, drilling rig, crane is recommended during construction phase.
- 3.11.2 The Contractor shall liaise with the school representative(s) to obtain the examination schedule so as to avoid noisy construction activities during school examination period. Scheduling of construction works outside school examination period to less intrusive periods or restricting critical works area would reduce the overall construction noise impacts at the NSRs and ensuring compliance with the construction noise criterion.
- 3.11.3 In addition to the above construction noise mitigation measures, good site practices listed below and the noise control requirements stated in EPD's "Recommended Pollution Control Clauses for Construction Contracts" should be included in the Contract Specification for the Contractors to follow and implemented to further minimize the potential noise impacts during the construction phase of the Project:
- Quiet PME, such as those listed in EPD's Quality Powered Mechanical Equipment, should be considered for construction works to further minimize the potential construction noise impact.
  - Only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction period.
  - Silencers or mufflers on construction equipment should be utilised and should be properly maintained during the construction program.
  - Mobile plant, if any, should be sited as far away from NSRs as possible.
  - Machines and plant (such as trucks) that may be in intermittent use should be shut down between works periods or should be throttled down to a minimum.
  - Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs.
  - Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.
- 3.11.4 The implementation schedule of the good site practices is presented in [Appendix B](#).

Operation PhaseRoad Traffic Noise

- 3.11.5 Direct noise mitigation measures including low noise road surfacing and noise barriers have been proposed to alleviate the traffic noise impact. **Table 3-5** and **Table 3-6** summarise the proposed noise mitigation measures.

**Table 3-5 List of Proposed Noise Mitigation Measures (Low-Noise Road Surfacing)**

ID	Road	Length, m
LNRS1 <sup>(1)</sup>	Tsing Tsuen Road	205

Note: (1) Only applies to "with Slip Road C" Option

**Table 3-6 List of Proposed Noise Mitigation Measures (Barriers and Enclosures)**

Noise Barrier ID	Barrier Type	Height, m	Length, m
N1	Cantilever	6.5m(H) with 3.5m cantilever at 45 degrees	100
N2 <sup>(1)</sup>	Vertical barrier	4.5m (H)	35
FE1	Full Enclosure	-	94
FE2			177
SE1	Semi-enclosure	-	470
SE2 <sup>(1)</sup>			270
SE3 <sup>(1)</sup>			70
SE4 <sup>(1)</sup>			500

Note:

(1) Only applies to "with Slip Road C" Option

- 3.11.6 After implementing the proposed LNRS, noise barriers and enclosures, the predicted overall noise levels at all NSRs comply with the relevant noise criteria. As no representative existing NSRs would fall within all the three testing criteria for eligibility test for indirect noise mitigation measures, it is considered that no indirect mitigation measures would be required.
- 3.11.7 The feasibility, practicability, programming and effectiveness of the above mitigation measures have been reviewed and confirmed by engineer.
- 3.11.8 The implementation schedule for the recommended mitigation measures is presented in [Appendix B](#).

**3.12 Audit Requirements**

- 3.12.1 Regular site environmental audit during the construction phase of the Project should be conducted at least once per week to ensure proper implementation of mitigation measures and good site practices as listed in Appendix B and the noise control requirements stated in EPD's "Recommended Pollution Control Clauses for Construction Contracts" to further minimize the potential noise nuisance during construction phase.
- 3.12.2 Road traffic noise levels should be monitored at representative NSRs, which are in the vicinity of the recommended direct mitigation measures, during the first year after road opening. The purpose of the monitoring is to ascertain that the recommended mitigation measures are effective in reducing the noise levels.

## 4. WATER QUALITY

### 4.1 Introduction

4.1.1 Potential water quality impacts arising from the construction and operation phases of the Project were identified and assessed in the EIA Report. With the implementation of the recommended mitigation measures, no adverse water quality impacts would be expected. No water quality monitoring is therefore considered necessary. Nonetheless, regular site inspections are recommended during the construction phase to ensure the recommended mitigation measures are properly implemented.

### 4.2 Mitigation Measures

4.2.1 Mitigation measures for water quality control during the construction phase have been recommended in the EIA Report. The Contractor should be responsible for the design and implementation of these measures. Recommended mitigation measures to minimise the adverse impacts on water quality during the construction activities are listed in the implementation schedule given in [Appendix B](#).

### 4.3 Construction Site Audits

4.3.1 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 shall include site inspections and compliance audits.

#### Site Inspections

4.3.2 Site inspections shall be carried out by the ET and shall be based on the mitigation measures for water pollution control recommended in [Appendix B](#). In the event that the recommended mitigation measures are not fully or properly implemented, deficiency shall be recorded and reported to the site management. Suitable actions are to be carried out to:

- Investigate the problems and the causes;
- Issue action notes to the Contractor which is responsible for the works;
- 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 Contractor for preventive actions.

#### Compliance Audits

4.3.3 Monitoring of the treated effluent quality from the Works Areas is required during the construction phase of the Project. The monitoring shall be carried out at the pre-determined discharge point. Compliance audits are to be undertaken to ensure that a valid discharge licence has been issued by EPD prior to the discharge of effluent from the Project site. The monitoring frequency and parameters specified in the discharge licence shall be fully considered during the monitoring. All monitoring requirements shall be approved by EPD. The audit results reflect whether the effluent quality is in compliance with the discharge licence requirements. In case of non-compliance, suitable actions shall be undertaken to:

- Notify the site management for the non-compliance;
- Identify the sources of pollution;
- Check the implementation status of the recommended mitigation measures;
- Investigate the operating conditions of the on-site treatment systems;
- Implement corrective and remedial actions to improve the effluent quality;
- Increase monitoring frequency until the effluent quality is in compliance with the discharge licence requirements; and
- Record the non-compliance and propose preventive measures.

## 5. WASTE MANAGEMENT

### 5.1 Introduction

- 5.1.1 Construction and Demolition (C&D) materials, chemical waste and general refuse from workforce would be generated during the construction phase. It is the Contractor's responsibility to ensure that all the waste arising 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 and relevant legislation are strictly followed, adverse environmental impacts would not be expected.
- 5.1.2 It is expected that no waste will be generated during the operation phase of the Project. As such, it is considered that there should be no adverse environmental impacts. Monitoring and audit programme for the operation phase of the Project would not be required.

### 5.2 Mitigation Measures

- 5.2.1 Mitigation measures for waste management recommended in the EIA Report should form the basis of the site Waste Management Plan (WMP), as part of the Environmental Management Plan (EMP) to be developed by the Contractor in the construction phase. [Appendix B](#) provides the implementation schedule of the recommended mitigation measures during both construction and operation phases.
- 5.2.2 Waste generated during the construction activities should be audited regularly by the ET to determine if waste is 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 licenses, permits, disposal and recycling records should be reviewed and audited for compliance with the legislations and contract requirements. In addition, the routine site inspections should check the implementation of the recommended good site practices, waste reduction measures, and other waste management mitigation measures.
- 5.2.3 With the appropriate handling, storage and removal of waste arisings during the construction of the Project as presented in [Appendix B](#), the potential to cause adverse environmental impacts would be minimized. During the site inspections, the ET shall pay special attention to the issues relating to waste management and check whether the Contractor has implemented the recommended good site practices, waste reduction measures and other mitigation measures.

### 5.3 Audit Requirement

- 5.3.1 Regular audits and site inspections should be carried out during construction phases by the ER, ET and Contractor to ensure that the recommended good site practices and the recommended mitigation measures listed in [Appendix B](#) 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 inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements.
- 5.3.2 The requirements of the environmental audit programme are set out in **Section 11** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

## **6. LAND CONTAMINATION**

- 6.1.1 The land contamination assessment has examined the potential contaminating land uses within the Project area and investigated any potential land contamination impacts arising from the Project.
- 6.1.2 Based on the site appraisal, no land contamination impact arising from Project is anticipated. No EM&A programme is therefore required.



## **7. LANDFILL GAS HAZARD**

### **7.1 Introduction**

7.1.1 A portion of the Project falls within the Gin Drinkers Bay Landfill and its 250m Consultation Zone, therefore, a qualitative assessment of landfill gas hazard has been carried out and for this EIA study. This section describes the landfill gas monitoring requirements for sensitive elements within the Project within the during the construction and operation phases.

### **7.2 Monitoring and Mitigation Measures**

7.2.1 General protection and precautionary measures have been proposed for consideration during the construction, design and operation phases of the development. Implementation of mitigation measures recommended in the EIA Report aims to minimize potential landfill gas hazard.

### **7.3 Construction Phase**

7.3.1 To protect site workers within GDBL and the Landfill Consultation Zone, Safety requirements stated in Chapter 8 of the Landfill Gas Hazard Assessment Guidance Note should be implemented properly during construction phase within the 250m consultation zone.

7.3.2 Monthly gas monitoring should also be conducted for offices, stores etc (if any) set up within areas of the Project location with GDBL and its 250m Consultation Zone. Monitoring requirements and procedures specified in Paragraphs 8.23 to 8.28 of EPD's Guidance Note are highlighted as follows:

- The monitoring equipment used should be capable of measuring methane, carbon dioxide and oxygen concentrations. The equipment should be intrinsically safe and calibrated according to the manufacturer's instructions.
- When portable monitoring equipment is to be used, the frequency and areas to be monitored should be set down prior to commencement of the works either by the Safety Officer or by an appropriately qualified person.
- All measurements should be made with the monitoring tube located not more than 10 mm from the surface.
- A standard form, detailing the location, time of monitoring and equipment used together with the gas concentrations measured, should be used when undertaking manual monitoring to ensure that all relevant data are recorded.
- If methane (flammable gas) or carbon dioxide concentrations are in excess of the trigger levels or that of oxygen is below the level specified in the Emergency Management in the following sections, then evacuation should be initiated.

7.3.3 Periodically during ground-works construction within the 250m Consultation Zone, the works area should be monitored for methane, carbon dioxide and oxygen using appropriately calibrated portable gas detection equipment. The monitoring frequency and areas to be monitored should be set down prior to commencement of ground-works either by the Safety Officer or an approved and appropriately qualified person.

7.3.4 Routine monitoring should be carried out in all excavations, manholes, chambers, relocation of monitoring wells and any other confined spaces that may have been created. All measurements in excavations should be made with the extended monitoring tube located not more than 10 mm from the exposed ground surface. Monitoring should be performed properly to make sure that the area is free of LFG before any man enters into the area.

7.3.5 For excavations deeper than 1m, measurements should be carried out:

- at the ground surface before excavation commences;
- immediately before any worker enters the excavation;
- at the beginning of each working day for the entire period the excavation remains open; and
- periodically throughout the working day whilst workers are in the excavation.

- 7.3.6 For excavations between 300mm and 1m deep, measurements should be carried out:
- directly after the excavation has been completed; and
  - periodically whilst the excavation remains open.
- 7.3.7 For excavations less than 300mm deep, monitoring may be omitted, at the discretion of the Safety Officer or other appropriately qualified person.
- 7.3.8 Depending on the results of the measurements, actions required will vary and should be set down by the Safety Officer or another appropriately qualified person. As a minimum these should encompass those actions specified in **Table 7.1**

**Table 7.1 - Actions in the event of LFG being detected**

Parameter	Threshold Concentration	Action in the event of exceedance of the Threshold Concentration
<b>Oxygen</b>	<19%	<ul style="list-style-type: none"> <li>• Ventilate to restore oxygen to &gt;19%</li> </ul>
	<18%	<ul style="list-style-type: none"> <li>• Stop works</li> <li>• Evacuate personnel/prohibit entry</li> <li>• Increase ventilation to restore oxygen to &gt;19%</li> </ul>
<b>Methane</b>	>10% LEL (i.e. > 0.5% by volume)	<ul style="list-style-type: none"> <li>• Prohibit hot works</li> <li>• Ventilate to restore methane to &lt;10% LEL</li> </ul>
	>20% LEL (i.e. > 1% by volume)	<ul style="list-style-type: none"> <li>• Stop works</li> <li>• Evacuate personnel / prohibit entry</li> <li>• Increase ventilation to restore methane to &lt;10% LEL</li> </ul>
<b>Carbon Dioxide</b>	>0.5%	<ul style="list-style-type: none"> <li>• Ventilate to restore carbon dioxide to &lt; 0.5%</li> </ul>
	>1.5%	<ul style="list-style-type: none"> <li>• Stop works</li> <li>• Evacuate personnel / prohibit entry</li> <li>• Increase ventilation to restore carbon dioxide to &lt; 0.5%</li> </ul>

- 7.3.9 In order to ensure that evacuation procedures are implemented in the event of the trigger levels specified in **Table 7.1** above being exceeded, it is recommended that a person, such as the Safety Officer, is nominated, with deputies, to be responsible for dealing with any emergency which may occur due to LFG.
- 7.3.10 In an emergency situation the nominated person, or his deputies, shall have the necessary authority and shall ensure that the confined space is evacuated and the necessary works implemented for reducing the concentrations of gas.

## 7.4 Operation Phase

- 7.4.1 For maintenance of TWR, resurfacing or other maintenance works will be carried out at open space and any risk from LFG are unlikely. However, if entry into manholes or chambers are undertaken, works in confined spaces under the Factories and Industrial Undertakings (Confined Spaces) Regulation of the Factories and Industrial Undertakings Ordinance should be observed and the Code of Practice for Safety and Health at Work in Confined Space should be followed to ensure compliance with the Regulation. Monitoring requirement and precaution measures will be formulated in risk assessment report by competent person under the Factories and Industrial Undertakings (Confined Spaces) Regulation.
- 7.4.2 In addition, if any construction is required for the maintenance work during operational stage, the responsible party should follow the monitoring works as recommended above for construction phase.

## **8. CULTURAL HERITAGE**

### **8.1 Introduction**

8.1.1 No built heritage resource is located within Project boundary or within the 100m assessment area. The closest built heritage is identified at approximately 110m from the Project boundary, no impact would be anticipated during the construction phase and operation phase.

8.1.2 No Site of Archaeological Interest (SAI) is identified within the assessment area. The natural terrain in the assessment area has been largely modified and the potential archaeological resources would have been disturbed by rapid developments of the new town, such as reclamation and modern fill lands for high-rise buildings and new road networks since the 1920s. As no marine works is required for the Project, no impact on marine archaeology would be anticipated. Hence, no archaeological impact would be anticipated during the construction phase and operation phase.

### **8.2 Mitigation Measures**

#### Construction Phase

8.2.1 No mitigation measure would be required for built heritage during construction phase.

8.2.2 No EM&A requirement would be required for archaeology and built heritage during construction phase. As a precautionary measure, AMO should be informed immediately in case of discovery of antiquities or supposed antiquities in the course of works, so that appropriate mitigation measures, if needed, can be timely formulated and implemented in agreement with AMO.

#### Operation Phase

8.2.3 No mitigation measure for cultural heritage resources would be required during operation phase.

## **9. LANDSCAPE & VISUAL**

### **9.1 Introduction**

9.1.1 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 to confirm the recommended landscape and visual impact mitigation measures are effectively implemented.

9.1.2 Site audit on landscape and visual aspects of the Project should be carried out during the construction phase. With the mitigation measures recommended in the EIA implemented, specific auditing during the operation phase of the Project is not required.

### **9.2 Mitigation Measures**

9.2.1 The landscape and visual mitigation measures should be incorporated in the detailed design. The mitigation measures during construction and operation phases as recommended in the EIA Report are presented in [Appendix B](#). Where feasible, 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 before commissioning of the Project.

9.2.2 Any potential conflicts among the proposed mitigation measures, the Project works, and operational requirements should also be identified and resolved at early stage. Any changes to the mitigation measures should be incorporated in the detailed design.

### **9.3 Audit Requirements**

9.3.1 Site audits should be undertaken during the construction phase and the 12-month establishment period (operation phase) to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives.

9.3.2 The ET shall audit the implementation of landscape construction works particularly during site clearance operations when the proposed tree felling and transplanting will take place and subsequent tree maintenance operations and planting works.

9.3.3 Site inspections should be undertaken by the ET at least once every month during the construction period, and once every two months for the 12-month establishment period during operation phase. After the establishment period, the completed landscape works will be handed over to the future maintenance and management departments for the long term maintenance and management in accordance with DEVB TCW No. 6/2015.

## **10. SITE INSPECTION / AUDIT**

### **10.1 Site Inspection Requirements**

- 10.1.1 Site inspection provides a direct means to trigger and enforce specified environmental protection and pollution control measures. These shall be undertaken regularly and routinely to inspect construction activities in order to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. The site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.
- 10.1.2 The ET Leader shall be responsible for formulating the environmental site inspection, the deficiency and remedial action reporting system, and for carrying out the site inspection works. He shall submit a proposal for site inspection and deficiency and remedial action reporting procedures to the Contractor for agreement, and to the ER for approval. The ET's proposal for rectification would be made known to the IEC.
- 10.1.3 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 works area which is likely to be affected, directly or indirectly, by the site activities. The ET shall make reference to the following information in conducting the inspection:
- the EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
  - ongoing results of the EM&A program;
  - works progress and programme;
  - individual works methodology proposals (which shall include proposal on associated pollution control measures);
  - contract specifications on environmental protection and pollution prevention control;
  - relevant environmental protection and pollution control laws; and
  - previous site inspection results undertaken by the ET and others.
- 10.1.4 The Contractor shall keep the ET Leader updated with all relevant information on the construction contract necessary for him to carry out the site inspections. Inspection results and associated recommendations for improvements to the environmental protection and pollution control works shall be submitted to the IEC and the Contractor within 24 hours for reference and for taking immediate remedial action. The Contractor shall follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and remedial action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.
- 10.1.5 The ET shall 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 Action Plan for environmental monitoring and audit.

### **10.2 Compliance with Legal and Contractual Requirements**

- 10.2.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which construction activities must comply.
- 10.2.2 In order that the works are in compliance with the contractual requirements, all 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 implementation schedule of mitigation measures is summarized in [Appendix B](#).
- 10.2.3 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 laws can be prevented.
- 10.2.4 The Contractor shall regularly copy relevant documents to the ET Leader so that works

checking could be carried out effectively. The document shall at least include the updated Works Progress Reports, updated Works Programme, any application letters for different license / permits under the environmental protection laws, and copies of all valid licenses / permits. The site diary shall also be available for the ET Leader's inspection upon his request.

10.2.5 After reviewing the documentation, the ET Leader shall advise the Contractor of any non-compliance with 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 license / permit application and any environmental protection and pollution control preparation works may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor accordingly.

10.2.6 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 in order to satisfy contractual and legal requirements.

### 10.3 Environmental Complaints

10.3.1 Complaints shall be referred to the ET Leader for action. The ET Leader shall undertake the following procedures upon receipt of any complaint:

- i. log complaint and date of receipt onto the complaint database and inform the IEC immediately;
- ii. investigate the complaint to determine its validity, and assess whether the source of the problem is due to works activities;
- iii. identify mitigation measures in consultation with the IEC if a complaint is valid and due to works;
- iv. advise the Contractor if mitigation measures are required;
- v. review the Contractor's response to identified mitigation measures, and the updated situation;
- vi. if the complaint is transferred from the Environmental Protection Department (EPD), submit interim report to the EPD on status of the complaint investigation and follow-up action within the time frame assigned by the EPD;
- vii. undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;
- viii. report investigation results and subsequent actions to complainant (if the source of complaint is identified through EPD, the results should be reported within the timeframe assigned by EPD); and
- ix. record the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

10.3.2 A flow chart of the complaint response procedure is shown in [Figure 10.1](#).

## **11. REPORTING**

### **11.1 Introduction**

11.1.1 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. This would enable a transition from a paper / historic and reactive approach to an electronic / real time proactive approach. All the monitoring data (baseline and impact) shall also be submitted in electronic format.

11.1.2 ET Leader shall submit baseline monitoring report, monthly Environmental Monitoring and Audit (EM&A) report, quarterly EM&A summary report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly, quarterly summary and final review EM&A reports shall be made available to the Director of Environmental Protection.

### **11.2 Electronic Reporting of EM&A Information**

11.2.1 To facilitate public inspection of the baseline monitoring report and various EM&A reports via the EIAO Internet website and at the EIAO register office, electronic copies of these reports shall be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF version 1.3 or later), unless otherwise agreed by EPD and shall be submitted at the same time as the hardcopies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of these reports shall be included at the beginning of the document. Hyperlinks to all figures, drawings and tables in these reports shall be provided in the main text from where the respective references are made. All graphics in these reports shall be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of these reports must be the same as the hard copies. The summary of the monitoring data taken shall be included in the various EM&A Reports to allow for public inspection via the EIAO Internet website.

### **11.3 Baseline Monitoring Report**

11.3.1 Baseline Environmental Monitoring Report(s) shall be prepared within 10 working days of completion of the baseline monitoring and then certified by the ET Leader. Copies of the Baseline Environmental Monitoring Report shall be submitted to the Contractor, the IEC, ER and EPD. The ET Leader shall liaise with the relevant parties on the exact number of copies they require.

11.3.2 The Baseline Environmental Monitoring Report shall include, but not be limited to the following information:

- i. up to half a page executive summary;
- ii. brief project background information;
- iii. drawings showing locations of the baseline monitoring stations;
- iv. an updated construction programme with milestones of environmental protection / mitigation activities annotated;
- v. monitoring results (in both hard and soft 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; and
  - quality assurance (QA) / quality control (QC) results and detection limits.
- vi. details on influencing factors, including:
  - major activities, if any, being carried out on the site during the period;
  - weather conditions during the period; and
  - other factors which might affect results.

- vii. determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the parameters monitored;
- viii. revisions for inclusion in the EM&A Manual; and
- ix. comments, recommendations and conclusions.

## 11.4 Monthly EM&A Reports

### *General*

- 11.4.1 The results and finding of all EM&A works required in the 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 in the month after the major construction works commence with the subsequently Monthly Reports due in 10 working days of the end of each reporting month. Copies of each monthly EM&A report shall be submitted to the parties: Contractor, IEC, HyD and EPD. Before submission of the first monthly EM&A Report, the ET shall liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic medium.
- 11.4.2 The ET leader shall 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.
- 11.4.3 The first monthly EM&A report shall include at least but not be limited to the following:
- 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 organisation including key personnel contact names and telephone numbers;
    - construction programme;
    - management structure, and
    - works undertaken during the month.
  - iii. environmental status:
    - advice on the status of statutory environmental compliance, such as 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
  - iv. a brief summary of EM&A requirements including:
    - all monitoring parameters;
    - environmental quality performance limits (Action and Limit levels);
    - Event and Action Plan;
    - environmental mitigation measures as recommended in the Final 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 electronic 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; and
  - weather conditions during the period.
- vii. graphical plots of the monitored parameters in the month annotated against:
  - the major activities being carried out on site during the period;
  - weather conditions that may affect the results;
  - any other factors which might affect the monitoring results; and
  - QA / QC results and detection limits.
- viii. report on non-compliance, complaints, notifications of summons and successful 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) 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 notification of summons and successful prosecutions for breaches of 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; 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.
- ix. 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;
  - record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.);
  - a forecast of the works programme, impact predictions and monitoring schedule for the next three months;
  - compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies; and
  - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

11.4.4 Subsequent monthly EM&A reports shall include the following:

- i. executive summary (1 - 2 pages):
  - breaches of Action Limit levels;
  - complaints log;
  - notifications of any summons and successful prosecutions;
  - reporting changes; and
  - future key issues.
- ii. basic project information:
  - project organisation including key personnel contact names and telephone numbers;
  - programme;
  - management structure;
  - works undertaken during the month; and
  - any updates as needed to the scope of works and construction methodologies.
- iii. environmental status:
  - advice on the status of statutory environmental compliance such as 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 month with illustrations including key personnel contact names and telephone numbers; and
  - drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.
- iv. 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;
  - parameters monitored;
  - monitoring locations (and depth);
  - monitoring date, time, frequency, and duration;
  - weather conditions during the period;
  - any other factors which might affect the monitoring results; and
  - QA /QC results and detection limits.
- vi. report on non-compliance, complaints, and notifications of summons and successful 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) 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 notification of summons and successful prosecutions for breaches of 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; 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.

vii. 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;
- record of any project changes from the originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc.); and
- comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

viii. appendices

- 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:
  - (a) major activities being carried out on site during the period;
  - (b) weather conditions during the period; and
  - (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;
- outstanding issues and deficiencies

11.4.5 A quarterly EM&A summary report of around five pages shall be produced by the ET Leader and shall 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 it is generating data with the necessary statistical power to categorically identify or confirm the absence of impact attributable to the works. Each quarterly EM&A report shall be submitted to the following parties: the IEC, the ER and EPD.

- i. executive summary (1 - 2 pages);
- ii. basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of works undertaken during the quarter;
- iii. a brief summary of EM&A requirements including:
  - monitoring parameters;
  - environmental quality performance limits (AL levels); and
  - environmental mitigation measures, as recommended in the Final EIA report.
- iv. advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the Final EIA report, summarised in the updated implementation schedule;
- v. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

- vi. graphical plots of the trends of monitored parameters over the past four 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; and
  - any other factors which might affect the monitoring results.
- vii. advice on the solid and liquid waste management status;
- viii. a summary of non-compliance (exceedances) of the environmental quality performance limits (AL levels);
- ix. a brief review of the reasons for and the implications of non-compliance, including a review of pollution sources and working procedures;
- x. a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- xi. a summarised record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- xii. 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;
- xiii. comments (for examples, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme); recommendations (for example, any improvement in the EM&A programme) and conclusions for the quarter; and
- xiv. proponents' contacts and any hotline telephone number for the public to make enquiries.

## **11.5 Final EM&A Review Report for Construction Phase**

- 11.5.1 The construction phase EM&A program shall be terminated based on the following basis (a) upon completion of those construction activities that have the potential to result in a significant environmental impact, (b) trends analysis to demonstrate the narrow down of monitoring exceedances due to construction activities and the return of ambient environmental conditions in comparison with baseline data; and (c) no environmental complaint and prosecution involved.
- 11.5.2 Prior to the proposed termination, it may be advisable to consult relevant local communities (such as village representatives/communities and/or District Boards). The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Engineer and the Project proponent followed by final approval from the Director of Environmental Protection.
- 11.5.3 The final EM&A review report for construction phase should be prepared by the ET Leader and contain at least the following information. The final EM&A review report shall be submitted to the following parties: the IEC, the ER and EPD.
  - i. executive summary (1 - 2 pages);
  - ii. basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of work undertaken during the course of the project or past twelve months;
  - iii. a brief summary of EM&A requirements including:
    - monitoring parameters;
    - environmental quality performance limits (Action and Limit levels); and
    - environmental mitigation measures, as recommended in the Final EIA report.

- iv. advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the Final EIA report, summarised in the updated implementation schedule;
- v. drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;
- vi. graphical plots of the trends of monitored parameters over the course of the project, for all 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; and
  - the return of ambient environmental conditions in comparison with baseline data.
- vii. compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies;
- viii. provide clear-cut decisions on the environmental acceptability of the project with reference to the specific impact hypothesis;
- ix. advice on the solid and liquid waste management status;
- x. a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- xi. a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;
- xii. a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- xiii. a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- xiv. review monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);
- xv. a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of breaches, investigation, follow-up actions taken and results;
- xvi. review the practicality and effectiveness of the EIA process and EM&A programme (for example, a review of the effectiveness and efficiency of the mitigation measures and the performance of the environmental management system, that is, of the overall EM&A programme), recommendations (for example, any improvement in the EM&A programme); and
- xvii. a conclusion to state the return of ambient and / or the predicted scenario as per EIA findings.

## 11.6 Data Keeping

- 11.6.1 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 documents should be properly maintained by the ET and be ready for inspection upon request. All relevant information should be recorded in electronic format, and the software copy must be available upon request. All document and data should be kept for at least one year after completion of the construction contract.

## 11.7 Interim Notifications of Environmental Quality Limit Exceedances

- 11.7.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the IEC, HyD and EPD, as appropriate. The notification shall be followed up with advice to IEC, HyD 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 notifications is presented in [Appendix E](#).