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1. INTRODUCTION

1.1 Background

1.1.1 The proposed Revised Trunk Road T4 is part of the strategic road network connecting Sha Tin Road with Tsing Sha Highway (TSH) and Shing Mun Tunnel Road (SMTR). Traffic between Ma On Shan area and Tsuen Wan / West Kowloon areas have to travel through Tai Po Road (Sha Tin Section) (TPR-ST) and other local roads in Sha Tin area currently. The Project, as a strategic route, would serve as a bypass route providing a direct connection for through traffic between Ma On Shan area and Tsuen Wan / West Kowloon areas without the need of travelling along the existing major roads in Sha Tin Central area, for example, TPR-ST, Tai Chung Kiu Road, etc., which are already very busy especially in peak hours. The Project will not only help to relieve traffic congestion on TPR-ST and other major roads in Sha Tin area but it also improve the capacity of major local road junctions by directing traffic between Ma On Shan and Tsuen Wan / West Kowloon areas away from the local road network.

1.1.2 An Environmental Impact Assessment (EIA) Study Brief for the Trunk Road T4 project (Study Brief No. ESB-094/2001) was issued in January 2002 by the Director of Environmental Protection in respect of a previous road alignment option. Based on this study brief, the EIA report for Trunk Road T4 (EIA Report No. AEIAR-084/2005) was approved by Environmental Protection Department (EPD) under the Environmental Impact Assessment Ordinance (EIAO) in May 2005.

1.1.3 In October 2006, upon receipt of support from the Traffic and Transport Committee (T&TC) of the Sha Tin District Council (STDC), Trunk Road T4 was gazetted under the Roads (Works, Use and Compensation) Ordinance. However, during the objection period, considerable number of public objections to the gazetted scheme were received. In view of the substantial received objections, the originally proposed alignment was not adopted. STDC T&TC withdrew the support on the Trunk Road T4 project and passed the motions that the Government should monitor and review the traffic condition of Sha Tin area after the commissioning of Tsing Sha Highway to determine whether Trunk Road T4 is still needed. The Trunk Road T4 project was therefore put on hold.

1.1.4 In March 2016, CEDD appointed a consultant to carry out a traffic review study under Agreement No. CE 71/2015 (HY) Traffic Study on Major Roads in Sha Tin – Feasibility Study to review the traffic situations in Sha Tin, identify the traffic problems and recommend mitigation measures. The feasibility study recommended, amongst other things, that Trunk Road T4 should be regarded as a medium-term measure to relieve traffic congestion in Sha Tin. To address the objections received during previous gazettal, an alternative alignment of Trunk Road T4 ("Revised Trunk Road T4") is proposed, under which the eastbound viaducts will be shifted away from the Scenery Court avoiding the conflict with existing Old and Valuable Trees (OVTs) along Chung Ling Road and the originally proposed viaducts in front of Sha Tin Tau Village (as well as the Riverpark, which did not exist during previous gazettal) will be converted to depressed roads and underpass. In January 2018, STDC T&TC gave the support on the Revised Trunk Road T4 scheme.

1.1.5 There is a need for the provision of the Trunk Road T4 in order to provide a direct connection for through traffic between Tai Wai and Ma On Shan bypassing the busy Sha Tin Central area. The road users can be benefited from this connection travel to/from the district such as Tai Wai, Ma On Shan, South-West New Territories and Tsing Yi etc. It was identified as a medium-term mitigation measures to alleviate the traffic congestion in Sha Tin District particularly for Tai Po Road and reduce the travel time for the passengers.

1.1.6 AECOM Asia Company Ltd was commissioned by Civil Engineering and Development Department (CEDD) to undertake "Agreement No. CE8/2018(HY) Revised Trunk Road T4 in Sha Tin and Associated Improvement Works in Sha Tin" (the Assignment) for provision of Revised Trunk Road T4 (the Project) to alleviate the traffic congestion in Sha Tin District. The Project is a Designated Project under the Environmental Impact Assessment Ordinance (EIAO). An EIA Study for the Project has been undertaken as part of the Assignment, in accordance with the EIA Study Brief (No. ESB-315/2019) and the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM).

1.2 Project Scope and Location

1.2.1 Location plan of the "Revised Trunk Road T4 in Sha Tin" (the Project) is shown in **Figure 1.1**. The Project is to provide a dual 2-lane trunk road of about 2.6km connecting Shing Mun Tunnel Road and Tsing Sha Highway in the northwest with Sha Tin Road in the

southeast and mainly comprises:

(i) Construction of dual two-lane elevated carriageways of approximately 1.4km long connecting Shing Mun Tunnel Road and Tsing Sha Highway to the proposed at-grade carriageways fronting the Riverpark;

(ii) Construction of dual two-lane at-grade carriageways and underpasses of approximately 600m long between the Riverpark and Tsang Tai Uk;

(iii) Construction of a slip road of approximately 80m long near the Riverpark connecting at-grade carriageway northbound and Lion Rock Tunnel Road northbound across Shing Mun River Channel;

(iv) Construction of a slip road of approximately 300m long near Tsang Tai Uk connecting Lion Rock Tunnel Road southbound and Sha Tin Road eastbound;

(v) Widening of a section of Sha Tin Road of approximately 150m long from a dual two-lane carriageway to a dual four-lane carriageway;

(vi) Modification of a section of the elevated carriageway of Shing Mun Tunnel Road eastbound near Chung Ling Lane of approximately 200m long to provide extra space for improved merging of traffic;

(vii) Modification and realignment of a section of Tung Lo Wan Hill Road, Chung Ling Road, Chung Ling Lane, Tai Po Road (Tai Wai Section), Shing Chuen Road, Shing Wan Road, Man Lam Road and Man Lai Road;

(viii) Construction of an at-grade and an elevated footpath of approximately 50m long across the proposed underpass near Sha Tin Tau Village;

(ix) Construction of an elevated cycle track and an elevated footpath of approximately 100m long across Shing Mun River Channel;

(x) Demolition of the existing subways across Lion Rock Tunnel Road fronting the Riverpark and construction of an elevated cycle track and an elevated footpath with lifts and staircases across Lion Rock Tunnel Road fronting the Riverpark;

(xi) Demolition of the existing pedestrian subway across Che Kung Miu Road and Lion Rock Tunnel near MTR Che Kung Temple Station and construction of an elevated footpath with lifts and staircases across Che Kung Miu Road;

(xii) Ancillary works including geotechnical, drainage, sewerage, water, utilities, lighting, landscaping, electrical and mechanical works, construction/reconstruction of noise barriers, retaining walls, slope improvement, mitigation works for natural terrain hazard near Shing Mun Tunnel Road and within Lion Rock Country Park and installation of street furniture and traffic aids; and

(xiii) Modification of Existing Noise Barrier/Enclosure at Tsing Sha Highway (Trunk Road T3).

1.3 Construction Programme

1.3.1 The Project construction works are anticipated to commence in Q4 2023 with completion of the Project by Q3 2028. A tentative construction programme 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 operational phases of the Project. It aims to provide systematic procedures for monitoring, auditing and minimizing 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 ecology;
- Section 8 – Sets out EM&A requirement for landscape and visual impact;
- Section 9 – Sets out EM&A requirement for cultural heritage;
- 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. Results indicated that no adverse air quality impact from the Project would be anticipated during construction phase. 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 – 3.2.6 of EIA Report. Implementation schedule of mitigation measures are presented in **Appendix B**.

2.1.3 No adverse air quality impact arising 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, utilities protection and diversion works, slope work, excavation, piling and roadworks, and wind erosion which would generate dust emissions. Therefore, 1-hour Total Suspended Particulates (TSP) is recommended to be monitored and audited at the proposed monitoring locations during construction phase.

2.2.2 The criteria against which ambient air quality monitoring to be assessed are 1-hour TSP limit of 500 µg m^{-3}. This level is not to be exceeded at ASRs.

2.2.3 Monitoring and audit of the TSP 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.

2.2.4 1-hour TSP levels should be measured to indicate the impacts of construction dust on air quality. The TSP levels should be measured by following the standard method as set out in High Volume Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA (hereinafter referred to as "HVS method"). Upon approval of EPD and IEC, an alternative sampling method of using direct reading methods which are capable of producing comparable results as that by the high volume sampling method can be used to indicate short event impacts

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

2.3 Monitoring Equipment

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

- 0.6 - 1.7 m^3 per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
- equipped with a timing / control device with ± 5 minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm^2 ;
- flow control accuracy: ± 2.5% deviation over 24-hour sampling period;
- equipped with a shelter to protect the filter and sampler;
- incorporated with an electronic mass flow rate controller or other equivalent devices;

- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;
- able to hold and seal the filter paper to the sampler housing at horizontal position;
- easy to change the filter; and
- capable of operating continuously for 24-hour period.

2.3.2 The ET shall be responsible for the provision of the monitoring equipment. He shall ensure that sufficient number of HVSs with appropriate calibration kit is available for carrying out the baseline, regular impacts monitoring and ad-hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals, in accordance with requirements stated in the manufacturers operating manual. All the equipment, calibration kit, filter papers, etc., shall be clearly labelled. If the ET Leader proposes to use a direct reading dust meter to measure 1-hour TSP levels, he shall submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that of the HVS before it may be used for the 1-hour sampling. The instrument shall also be calibrated regularly, and the 1-hour sampling shall be determined periodically by HVS to check the validity and accuracy of the results measured by direct reading method.

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

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

2.3.5 Wind data monitoring equipment shall also be provided and set up at conspicuous locations for logging wind speed and wind direction near to the dust monitoring locations. The equipment installation location shall be proposed by the ET 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 periodically for analysis at least once a month;
- 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.

2.3.6 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 Laboratory Measurement / Analysis

2.4.1 A clean laboratory with constant temperature and humidity control and equipped with necessary measuring and conditioning instruments to handle the dust samples collected, shall be available for sample analysis, and equipment calibration and maintenance. The laboratory shall be the Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited or other internationally accredited laboratory.

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

2.4.3 The IEC shall conduct regular audit of the measurement performed by the laboratory so as to ensure the accuracy of measurement results. The ET shall provide the ER with one copy of the Title 40 of the Code of Federal Regulations, Chapter 1 (Part 50), Appendix B

for his/her reference.

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

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

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

2.5 Monitoring Locations

2.5.1 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 **Table 2.1** below and shown in **Figure 2.1.1**, **Figure 2.1.2**.

Table 2-1 Proposed Construction Dust Monitoring Stations

Monitoring Station ID	EIA ID	Location	Approximate Horizontal Distance from the Nearest Road Alignment (m)
AM1	ASTC1	Sha Tin Student Health Service Centre	5
AM2	AHKHM1	Hong Kong Heritage Museum	10
AM3	ARP5	Zenith Kindergarten	<5
AM4	ASTTV2	Sha Tin Tau Village	15
AM5	ASTTV3	Sha Tin Tau Village	15
AM6	ASRACP1	SRACP Teen Guard Valley Crime Prevention Education	10
AM7	ACC1	Christ College	30
AM8	ASIB1	Sunking Industry Building	5
AM9	AWWTC1	Buddhist Wong Wan Tin College	150
AM10	APH1	House 9, Peak House	50
AM11	ATLWV4	Tung Lo Wan Village	20
AM12	ALDSC1	The Church of Jesus Christ of the Latter-days Saint	20

2.5.2 The status and locations of the air quality 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.

2.5.3 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.

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

i. a horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
ii. no two samplers shall be placed less than 2 meters apart;

iii. the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
iv. a minimum of 2 metres of separation from walls, parapets and penthouses is required for rooftop samplers;
v. a minimum of 2 metres of separation from any supporting structure, measured horizontally is required;
vi. no furnace or incinerator flue is nearby;
vii. airflow around the sampler is unrestricted;
viii. the sampler is more than 20 metres from the dripline;
ix. any wire fence and gate, to protect the sampler, shall not cause any obstruction during monitoring;
x. permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
xi. a secured supply of electricity is needed to operate the samplers.

2.6 Baseline Monitoring

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

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

2.6.3 TSP baseline monitoring should be carried out at all of the designated monitoring locations for at least 14 consecutive days prior to the commissioning of the construction works. 1-hour TSP sampling shall be done at least three times per day at each monitoring station. During the baseline monitoring, there should not be any construction or dust generating activities in the vicinity of the monitoring stations. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should also be recorded throughout the baseline monitoring period. A summary of baseline monitoring is presented in **Table 2.2**.

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

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

2.6.6 If the ET Leader considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels. The monitoring should be at times when the Contractor's activities are not generating dust, at least in the proximity of the monitoring stations. The revised baseline levels, in turn, the air quality criteria, shall be agreed with the IEC and EPD.

2.7 Impact Monitoring

2.7.1 The ET shall carry out impact monitoring during construction phase of the Project. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs. In case of non-compliance with the air criteria, more frequent monitoring, as specified in the Action Plan in the following section, should be conducted. This additional monitoring should be continued until the excessive dust emission or the deterioration in the air quality is rectified. The impact monitoring programme is summarized in **Table 2.2**.

2.7.2 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	Frequency
Baseline Monitoring	Consecutive days of at least 2 weeks before commencement of major construction works	1-hour TSP	3 times per day
Impact Monitoring	Throughout the construction phase	1-hour TSP	3 times in every 6 days

2.8 Event and Action Plan

2.8.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. **Table 2.3** shows the air quality criteria, namely Action and Limit levels to be used. 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)

Parameter	Action Level [1]	Limit Level
TSP (1 hour average)	BL <= 384 μgm^{-3}, AL = (BL * 1.3 + LL)/2 BL > 384 μgm^{-3}, AL = LL	500 μgm^{-3}

Note:
[1] BL = Baseline level, AL = Action level, LL = Limit level

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

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling	1. Identify source, investigate the causes of complaint and propose remedial measures; 2. Inform Contractor, IEC and ER; 3. Repeat measurement to confirm finding; and 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; and 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Notify Contractor.	1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; and 3. Amend working methods agreed with the ER as appropriate.
Action level being exceeded by two or more consecutive sampling	1. Identify source; 2. Inform Contractor, IEC and ER; 3. Advise the Contractor and ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with Contractor, IEC and ER; and 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Advise the ET and ER on the effectiveness of the proposed remedial measures; and 5. Supervise Implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; and 4. Amend proposal as appropriate.
Limit level being exceeded by one sampling	1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform Contractor, IEC, ER, and EPD; 3. Repeat measurement to confirm finding; 4. Increase monitoring frequency to daily; and 5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results.	1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; and 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented.	1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification; 4. Implement the agreed proposals; and 5. Amend proposal if appropriate.
Limit level being exceeded by two or more consecutive sampling	1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 3. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 4. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; and 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

2.9 Mitigation Measures

2.9.1 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.

2.10 Audit Requirements

2.10.1 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 impact from the Project.

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 ($L_{eq\ (30\text{-}min)}$). $L_{eq\ (30\text{-}min)}$ 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 L_{10} and L_{90} should also be obtained for reference. Sample noise field data sheets are shown in **Appendix C** 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 3.1.1**, **Figure 3.1.2** 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	STC1	Sha Tin (Tai Wai) Clinic at Man Kam Road	Works at Zone A3 during non-restricted hours
CM2	EBI1	Ecclesia Bible Institute at Tai Chung Kiu Road	Works at Zone A5, B1a during non-restricted hours
CM3	TTU2	Tsang Tai Uk	Works at Zone B3 during non-restricted hours
CM4	CC1	Christ College	Works at Zone B4 during non-restricted hours
CM5	VM	Villa Maria	Works over MTRC East Rail Line during restricted hours
CM6	TFSR2	18 To Fung Shan Road	Works over Caltex – Tai Wai petrol filling station (Lot. No. STT2211) during restricted hours

3.4.2 The status and locations of noise sensitive receivers (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 Baseline Monitoring for Construction Noise

3.5.1 Baseline noise monitoring shall be carried out daily in all of the identified monitoring stations for at least 2 weeks prior to the commissioning of the construction works. A schedule of the baseline monitoring shall be submitted to the IEC for approval before the monitoring starts.

3.5.2 During the baseline monitoring, there shall not be any construction activities in the vicinity of the monitoring stations.

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

3.6 Impact Monitoring for Construction Noise

3.6.1 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.

3.6.2 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.

3.6.3 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.

3.7 Event and Action Plan for Construction Noise

3.7.1 The Action and Limit levels for construction noise are defined in

3.7.2 **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 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	1. Notify IEC and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; and 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the analyzed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; and 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analyzed noise problem; and 4. Ensure remedial measures are properly implemented.	1. Submit noise mitigation proposals to IEC; and 2. Implement noise mitigation proposals.
Limit Level	1. Identify source; 2. Inform IEC, ER, EPD and Contractor; 3. Repeat measurements to confirm findings; 4. Increase monitoring frequency; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analyzed noise problem; 4. Ensure remedial measures properly implemented; and 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.	1. Take immediate action to avoid further exceedance; 2. Submit proposals for remedial actions to IEC within 3 working days of notification; 3. Implement the agreed proposals; 4. Resubmit proposals if problem still not under control; and 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

3.8 Noise Parameters for Operation Road Traffic Noise

3.8.1 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 $L_{10\ (1\text{-}hr)}$. 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.

3.8.2 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.

3.9 Monitoring Locations for Operation Road Traffic Noise

3.9.1 The most affected 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 3.2.1** **&** **Figure 3.2.2**. 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	MSC1	Fai Shing House, May Shing Court	LNRS1
OM2	VM	Villa Maria	N1
OM3	STC1	Sha Tin (Tai Wai) Clinic	N2, N3
OM4	RP4	Tower 2, Riverpark	N4
OM5	STTV4	Sha Tin Tau Village	FE1
OM6	PTH2	Pok Tat House, Pok Hong Estate	LNRS1

3.9.2 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.

3.9.3 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.

3.10 Impact Monitoring for Operation Road Traffic Noise

3.10.1 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.

3.10.2 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 before deposit with EPD.

3.10.3 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.

3.10.4 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.

3.11 Event and Action Plan for Road Traffic Noise

3.11.1 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.

3.12 Mitigation Measures

Construction Phase

3.12.1 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<=10kg, concrete lorry mixer, concrete mixer, poker vibratory hand-held, drilling rig, crane is recommended during construction phase.

3.12.2 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.

3.12.3 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.

3.12.4 The implementation schedule of the good site practices is presented in **Appendix B**.

Operation Phase

Road Traffic Noise

3.12.5 Direct noise mitigation measures including low noise road surfacing and noise barriers, and special building designs 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	Proposed slip road SR1-1	180
LNRS2	Proposed T4 (westbound) slip road	210

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

Noise Barrier ID	Location	Barrier Type	Height, m	Length, m
N1	Shing Mun Tunnel Road	Vertical barrier	2	60
N2	T401	Vertical barrier	5	130
N3	T403	Cantilever barrier	5.5m(H) with 1.5m cantilever at 45º	100
N4	T403	Cantilever barrier	2.7m(H) with 3.7m cantilever at 20º from ground level	50
SE1	T401, T403 & T404	Semi-enclosure	[1]	170
FE	Shatin Road	Full enclosure	[1]	390

Note:
[1] Height of the semi/ full enclosures will be determined in detail design stage.

3.12.6 After implementing the proposed LNRS, noise barriers and enclosures, the predicted overall noise levels at all NSRs comply with the relevant noise criteria. Based on the criteria as stated in Section 4.6.2.8 of the EIA Report, the eligibility test for indirect noise mitigation measure is conducted. Details of the eligibility test are given in **Appendix 4.18** of the EIA Report. As no representative existing NSRs would fall within all the three testing criteria, it is considered that no indirect mitigation measures would be required.

3.12.7 The feasibility, practicability, programming and effectiveness of the above mitigation measures have been reviewed and confirmed by engineer.

3.12.8 The implementation schedule for the recommended mitigation measures is presented in **Appendix B**.

3.13 Audit Requirements

3.13.1 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.

3.13.2 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, excavated sediment, 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 adverse land contamination impact arising from Project is anticipated. No EM&A programme is therefore required.

7. ECOLOGY (TERRESTRIAL)

7.1 Introduction

7.1.1 Potential ecological impacts arising from the construction and operation phases of the Project were assessed in the EIA Report. Mitigation measures have been recommended to minimize the potential direct and indirect impacts to the sites of conservation importance and natural habitats, as well as the associated wildlife. With the implementation of appropriate mitigation measures, no unacceptable adverse residual impacts would be anticipated. Nonetheless, EM&A is considered necessary during construction of the Project and the requirements are described below.

7.2 Mitigation Measures

7.2.1 The implementation of mitigation measures recommended in the EIA Report to minimize potential ecological impacts are provided in **Appendix B**.

7.3 Monitoring Requirements

7.3.1 The implementation of the mitigation measures recommended in **Appendix B** should be subjected to monthly site audit throughout the construction phase. In case of non-compliance, the Contractor should be informed to strengthen the proposed mitigation measures accordingly.

7.3.2 Considering the location of ardeid night roosts along SMRC could vary, a pre-construction ardeid survey should be conducted to ascertain the status and extent of the ardeid night roost no earlier than 3 months before the commencement of construction works. Site check should be conducted covering the ardeid night roosting site between Man Lai Court and HKHM to record the location of ardeid roosting trees, the ardeid species and abundance utilizing the night roosting site. A plan detailing the survey methodology should be submitted to and approved by AFCD. The findings of the pre-construction ardeid survey should be submitted and approved by AFCD. The findings of the pre-construction ardeid survey will be reviewed to verify if any unwanted direct encroachment of construction works to ardeid roosting tree would occur according to latest extent of ardeid night roosting prior to the construction activities. In case there is any unwanted direct encroachment to the ardeid roosting tree, remedial actions should then be recommended, where appropriate, in consultation with relevant authorities.

7.3.3 During construction phase, monthly ardeid monitoring should be conducted to monitor the extent and status of ardeid night roost, and the effectiveness of proposed mitigation measures (e.g. restriction time of construction works, avoid encroachment on ardeid night roost site) and to identify if there are any unforeseen ecological impacts arising from the proposed Project. A plan detailing the monitoring methodology should be submitted to and approved by AFCD and the monitoring data should be included in the monthly EM&A report. In case of any unforeseen ecological impacts identified, remedial actions should then be recommended, where appropriate, in consultation with relevant authorities.

7.3.4 Two flora species of conservation importance (Butulang Canthium and Ailanthus) were recorded within the Project footprint. Another six flora species of conservation importance (Butulang Canthium, Incense Tree, Luofushan Joint-fir, Small Persimmon, *Rhododendron* spp. and Hairy-fruited Ormosia) were recorded in the vicinity of the Project footprint of flexible and rigid barriers. A detailed vegetation survey at potentially impacted areas and effective implementation of suitable mitigation measures (e.g. preserve in-situ, transplantation) should be conducted prior to site clearance. In case of unavoidable loss of flora species of conservation importance according to the Plant Preservation and Transplantation Proposal (PPTP), a 3-year post-transplantation monitoring programme should be carried out to ensure the establishment of the transplanted plants. Details of post-transplantation monitoring programme such as target species, monitoring frequency and parameters, maintenance works would be recommended in the PPTP. Regular site inspection and monitoring should be conducted to ensure that the proposed works would be confined within the Project footprint and that all retained trees and flora species of conservation importance identified in the PPTP at and near the Project footprint would be protected and preserved in situ properly.

8. LANDSCAPE & VISUAL

8.1 Introduction

8.1.1 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.

8.1.2 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.

8.2 Mitigation Measures

8.2.1 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.

8.2.2 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.

8.3 Audit Requirements

8.3.1 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.

8.3.2 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.

8.3.3 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.

9. CULTURAL HERITAGE

9.1 Introduction

9.1.1 Nine historic buildings, a new item pending for grading assessment and a nil grade building, thirty-one buildings with no grade were identified within the 300 m assessment area. Among the identified built heritage, the Gatehouse of Pok Ngar Villa, Tsang Tai Uk, Li Cottage, Ng Yuen and OLD26 are located in close proximity to the proposed works. Potential direct impacts of damages through contacting with construction machineries and site negligence, indirect impacts of ground-borne vibration, tilting, settlement and dust nuisance would be anticipated for the five built heritage resources during construction phase. Lau Ancestral Hall, High Rock Christian Camp and No. 1, 2 and 3 First Street, Tai Wai, as well as OLD1, OLD9, OLD11-21, OLD27-28 are situated in the vicinity of the site. Indirect impacts including ground-borne vibration, tilting and settlement, would be anticipated during construction phase.

9.2 Mitigation Measures

9.2.1 The implementation of mitigation measures recommended in the EIA Report to minimize potential impacts on cultural heritage are provided in **Appendix B**.

Construction Phase

9.2.2 Pre and post condition survey of Gatehouse of Pok Ngar Villa, Tsang Tai Uk, Li Cottage and Ng Yuen shall be carried out. The survey reports shall be submitted to AMO for record.

9.2.3 Monitoring of vibration, settlement and tilting incorporated with a set of Alert, Alarm and Action (3As) system shall be employed for Tsang Tai Uk, Gatehouse of Pok Ngar Villa, Li Cottage, Lau Ancestral Hall, Ng Yuen, High Rock Christian Camp and No. 1, 2 and 3 First Street, and OLD1, OLD9, OLD11-21, OLD27-28 during the construction phase. The proposed 3As limiting criteria are presented in **Table 9-1**. Monitoring proposal including checkpoint locations, installation details, response actions for each of the Alert/ Alarm/ Action (3As) levels and frequency of monitoring should be submitted for AMO's consideration. Installation of monitoring checkpoints shall be carried out in great care and adequate protection shall be provided so as to avoid unnecessary disturbance / damage to nearby historic fabrics. Photo records of monitoring checkpoints shall be submitted upon installation for AMO's records. Monitoring records should also be submitted to AMO on regular basis and alert AMO should the monitoring reach 3As levels.

9.2.4 Excavation works should not jeopardize stability of the historic buildings. Foundation information of the historic buildings shall be verified on site if needed, sufficient lateral support should be provided and de-watering (if required) should be carried out with great cautions to control ground movement and change of ground water regime at the heritage site.

9.2.5 Buffer zones with physical barriers should be employed for Tsang Tai Uk, the Gatehouse of Pok Ngar Villa, and OLD26. Substantial physical barriers, such as hoarding or water-filled barriers, should be set up between the project site and each of the three built heritage resources, Li Cottage, Ng Yuen and OLD26. Protective covering of plastic sheets shall be provided for Tsang Tai Uk, the Gatehouse of Pok Ngar Villa, Li Cottage, and Ng Yuen during construction to avoid impacts of dust nuisance.

9.2.6 A detailed design proposal including method of works and impact assessments for the four built heritage including (a) Gatehouse of Pok Ngar Villa (new item); (b) Li Cottage (Grade 1); (c) Ng Yuen (Grade 3); (d) Tsang Tai Uk (Grade 1) should be submitted. The impact assessment should also include an analysis of settlement for Tsang Tai Uk due to construction works.

9.2.7 No specific EM&A requirement would be required for archaeology 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.

Operational Phase

9.2.8 No mitigation measure would be required during operation phase.

Table 9-1 Proposed AAA Limiting Criteria for Vibration, Settlement and Tilting Level Monitoring during Construction

Type of Monitoring for	Alert	Alarm	Action
Vibration (PPV)	3mm/s	4mm/s	5mm/s
Settlement	6mm	8mm	10mm
Tilting	1/2000	1/1500	1/1000

9.3 Audit Requirement

9.3.1 The mitigation measures listed in **Appendix B** shall be adopted and properly implemented during the construction phase.

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 Adobe 11 Pro version 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, CEDD 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 upon completion of those construction activities that have the potential to result in a significant environmental impact.

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, CEDD and EPD, as appropriate. The notification shall be followed up with advice to IEC, CEDD 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 D**.