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1. INTRODUCTION

1.1 Background

1.1.1.1 Road P1 is an integral part of the holistic transportation network proposed to connect Tung Chung to Sunny Bay to accommodate the long-term traffic demand and strengthen the connectivity of the major developments along the northern shore of Lantau. It runs essentially along the northern side of Lantau Island and in parallel with the North Lantau Highway (NLH), comprising two sections – (i) Tung Chung to Tai Ho Section, which is within the scope of 799CL entitled “Tung Chung New Town Extension – Detailed Design and Site Investigation” and is being constructed under Tung Chung New Town Extension (TCNTE), and (ii) Tai Ho to Sunny Bay Section, which the Project specifically covers.

AECOM Asia Company Limited (AECOM) was commissioned by Civil Engineering and Development Department (CEDD) to carry out the Agreement No. CE 75/2020(HY) for the investigation for Road P1 (Tai Ho – Sunny Bay Section), Lantau (hereinafter referred to as “the Project”), with an aim to extend the committed Tung Chung to Tai Ho Section of Road P1 being constructed under TCNTE from Tai Ho Interchange to Sunny Bay and to modified the westbound carriageway of NLH between Sunny Bay Interchange and the former Lantau Link Toll Plaza connecting with Road P1 to relieve the traffic pressure on the NLH and enhance the capacity and resilience of the traffic to and from between Lantau and urban areas. This Project also covers provision of cycle track and footpath alongside the proposed carriageway, which form part of the continuous coastal cycle track planned as part of the North Lantau Recreation Corridor under the “Lantau Conservation and Recreation Masterplan”.

1.2 Project Scope and Location

1.2.1.1 Location of the Project is shown in [Figure 1.1](#). The scope of the Project comprises mainly the followings:

- (a) Construction of a dual 2-lane carriageway of approximately 9.5 km long from Tai Ho Interchange to Sunny Bay with slip roads for connection with SHW Depot, NLH, PBH and the existing road network at Sunny Bay, as well as for future connection with the planned Route 11 and / or Tsing Yi – Lantau Link (TYLL) and other future planned road network;
- (b) reclamation works of about 14.7 hectares between Tai Ho Interchange and Sham Shui Kok for the proposed road works;
- (c) widening the westbound carriageway of NLH from 3-lane to 4-lane between Sunny Bay Interchange and the former Lantau Link Toll Plaza;
- (d) construction of cycle track and footpath along the proposed carriageway from Tai Ho Interchange to Sunny Bay;
- (e) reprovision of the existing barging point at Siu Ho Wan to Sham Shui Kok; and
- (f) the associated civil, structural, geotechnical, landscaping, streetscaping works, ancillary works and provision of environmental protection and mitigation works associated with the Project.

1.3 Construction Programme

1.3.1.1 The construction works of the Project will tentatively commence in 2027 for completion by 2031. The tentative construction programme is provided in [Appendix A](#).

1.4 Purpose of this Manual

1.4.1.1 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.

1.4.1.2 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.

1.4.1.3 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.

1.4.1.4 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

1.5.1.1 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 organisation and lines of communication with respect to EM&A works are shown in [Figure 1.2](#).

Engineer or Engineer's Representative (ER)

1.5.1.2 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 Environmental Permit (EP), the approved EIA Report, EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce environmental impacts in accordance with the Event and Action Plans;
- Participate in joint site inspection undertaken by the ET; and
- Adhere to the procedures for carrying out complaint investigation.

The Contractor

1.5.1.3 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)

1.5.1.4 An ET shall be established prior to the commencement of the construction of the project to implement the EM&A programme to ensure the Contractor's compliance with the project's environmental performance requirements. The ET shall be led and managed by the ET Leader. The ET shall be directly employed by the Project Proponent or shall be part of the Resident Site Staff of the Engineer and directly supervised by the Engineer or Engineer's Representative. The ET shall be an independent party from the Contractor and the IEC. The ET Leader shall possess at least 7 years of experience in EM&A and/or environmental management and have relevant professional qualifications or have sufficient relevant EM&A experience subject to approval of the ER and Environmental Protection Department (EPD).

1.5.1.5 The duties and responsibilities of the ET are:

- Monitor various environmental parameters as required in this EM&A Manual;
- Analyse the EM&A data and review the success of EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions, and to identify any adverse environmental impacts arising;
- 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 EM&A results to the IEC, Contractor, the ER or its delegated representative and EPD;
- Recommend suitable mitigation measures to the Contractor in the case of exceedance of Action and Limit levels in accordance with the Event and Action Plans;
- 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 12.3](#) of this EM&A Manual.

Independent Environmental Checker (IEC)

1.5.1.6 The IEC shall be employed by the project proponent prior to the commencement of the construction of the Project. The IEC shall be an independent party from the Contractor and the ET. The IEC shall possess at least 7 years of experience in EM&A and/or environmental management.

1.5.1.7 The duties and responsibilities of the IEC are:

- Validate and confirm the accuracy of monitoring results, appropriateness of monitoring equipment, monitoring locations with reference to the locations of the nearby sensitive receivers, and monitoring procedures;
- On an as needed basis, verify and certify the environmental acceptability of the permanent and temporary works, relevant plans and submissions required in the EM&A manual and/or under the EP;
- Review and verify 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, and verify investigation results of complaint cases and the effectiveness of corrective measures..

1.5.1.8 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.

2. AIR QUALITY

2.1 Introduction

- 2.1.1.1 Potential air quality impacts arising from the construction and operational phases of the Project were addressed in the EIA Report. With the implementation of mitigation measures specified in the Air Pollution Control (Construction Dust) Regulation and the Air Pollution Control (Non-road Mobile Machinery) (Emission) Regulation together with the recommended control measures and good site practices, no adverse air quality impact due to the construction activities of the Project would be anticipated. Nonetheless, monitoring and audit programme for the construction phase air quality impacts should be conducted to check compliance with the legislative requirements and ensure the proper implementation of the air quality control measures.
- 2.1.1.2 No adverse air quality impact was predicted during the operation phase of the Project, thus mitigation measure is deemed not necessary. No EM&A requirement is considered necessary during the operational phase.

2.2 Construction Phase Air Quality Monitoring

2.2.1 Monitoring Parameters

- 2.2.1.1 Air quality impact arising from the construction activities of the Project would mainly be related to construction dust from site clearance, demolition of the existing structure, and minor excavation with limited backfilling for column installation and wind erosion of the limited exposed area which would generate dust emissions. Therefore, 1-hour Total Suspended Particulates (TSP) concentration, 1-hour and 24-hour average Respirable Suspended Particulate (RSP) concentrations, and 24-hour average Fine Suspended Particulate (FSP) concentration are recommended to be monitored and audited at the proposed monitoring locations during the construction phase.
- 2.2.1.2 The criteria against which ambient air quality monitoring to be assessed are 1-hour TSP limit of $500 \mu\text{g}/\text{m}^3$, 1-hour RSP action level of $128 \mu\text{g}/\text{m}^3$, 24-hour RSP limit of $75 \mu\text{g}/\text{m}^3$ and 24-hour FSP limit of $37.5 \mu\text{g}/\text{m}^3$. The 24-hour limit for FSP, and 1-hour action level and 24-hour limit for RSP are subject to change based on the prevailing AQOs implemented at the time of the dust monitoring works. The limit levels are not to be exceeded at ASRs.
- 2.2.1.3 Monitoring and audit of the TSP, RSP and FSP levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action shall be undertaken to rectify such situation.
- 2.2.1.4 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 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
- 2.2.1.5 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](#).

2.2.2 Monitoring Equipment

TSP Monitoring

- 2.2.2.1 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 m³ 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 cm²;
- flow control accuracy: $\pm 2.5\%$ 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.

2.2.2.2 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.

2.2.2.3 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.

2.2.2.4 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](#).

RSP and FSP Monitoring

2.2.2.5 RSP and FSP concentrations shall be monitored continuously by air sensor at monitoring stations specified in [Section 2.2.4](#). The air sensor to be employed shall meet the purpose of the monitoring which is 1-hour RSP, 24-hour RSP and 24-hour FSP concentrations in the ambient air. The air sensor shall have a resolution of at least 1 $\mu\text{g}/\text{m}^3$, an accuracy of $\pm 10\%$ to standard particles, equipped with a shelter to protect the sensor and capable of operating continuously for a 7 days period. It shall be capable of detection of PM₁₀ and PM_{2.5}, while size specification would be optional subject to the environmental management strategy of the site. Particulates is typically measured using an optical approach where light scattered by a particle is used to estimate the particle mass concentration. The measurement range and detection limit of the air sensor shall be able to measure the full range of particulates commonly found in the ambient, e.g. 0 – 1000 $\mu\text{g}/\text{m}^3$. The accuracy of a sensor, in terms of precision and bias, shall also be evaluated during selection of air sensor, according to the manufacturer's specification, evaluation reports and published literature. Whether the air sensor has calibrated upon purchase, when and how collocation shall be performed and how to correct the measurement shall be consulted with the sensor manufacturer and fully understood before the air monitoring. Other factors, such as response time, durability, enclosure, ease of use, power supply, any data display, data transmission, data access, data handling and cost shall also be considered when selecting air sensor. Guidelines on the use

of air sensor refer to The Enhanced Air Sensor Guidebook 2022, USEPA, or for further technical details at USEPA's Air Sensor Toolbox website.

- 2.2.2.6 Generally, air sensors should be placed at least 1.5 m above ground and away from any obstruction, vegetation or emission source which would interfere with the measurement. Other factors of the monitoring location, such as security, availability of power supply, reliable communication (cellular, Wi-Fi, etc.), should also be considered.

On-site Calibration and Quality Control

- 2.2.2.7 To ensure accuracy of the measurement, monitoring equipment, including the air sensors, should be calibrated regularly. The calibration should be conducted by collocating the air sensor and a Transfer Standard (TS).
- 2.2.2.8 A Transfer Standard (TS) is another particulate matter (PM) monitor that is at least as capable as the air sensor to be calibrated. Another sensor that has just been calibrated may serve the purpose provided its performance is known to be stable during the subsequent collocation period to be used as TS. Right before each on-site calibration, the TS itself needs to be calibrated e.g. collocating with an PM reference monitor - such as the Federal Reference Method (FRM) or the Federal Equivalent Method (FEM) PM monitor at the accredited laboratories or research institutes - that has been calibrated against traceable standard. The TS/reference monitor collocation should last at least seven days.
- 2.2.2.9 The TS with known performance characteristics will visit and collocate with each air sensor for calibration. During collocation, the TS should be placed near the subject sensor (<1 m if practicable) so that both devices would be monitoring under the same environment, i.e. the same pollution sources and weather conditions. The TS is then turned on to warm-up for 30 – 60 minutes. The collocation period starts after the warm-up and TS is then left running with the subject sensor for at least three hours. The measurements from the sensor to be calibrated and the TS during the collocation period will be statistically analysed. The response of the sensor should be adjusted if its performance during on-site calibration does not meet the evaluation criteria as shown in [Table 2.1](#).

Table 2.1 Recommended Performance Metrics and Target Values for On-site Checking of PM Monitoring Equipment

Performance Metric			Target Value
Tier 1 – Linear regression of minute average measurements	Bias	Slope	0.75 – 1.25
	Linearity	Coefficient of Determination (R ²)	>0.70
Tier 2 – Root mean squared error of minute average measurements	Error	Root Mean Squared Error (RMSE)	<8 µgm ⁻³ for RSP and <5 µgm ⁻³ for FSP

- 2.2.2.10 On-site calibration of the monitoring equipment shall be conducted by ET and agreed by IEC on the following approach:
- Prepare a TS for PM monitoring, which has been calibrated against a PM reference monitor (i.e. the FRM or FEM PM monitor).
 - The inlets of the TS and the subject sensor shall be colocated at the same height with a horizontal separation distance of <1 m.
 - Warm-up the transfer standard on-site if necessary.
 - Collocated monitoring shall be conducted in a continuous period to collect at least 180 valid minute average measurements. The valid data rate shall be at least 80% during the collocation period.
 - The collected minute average measurement results should be statistically analysed using the two-tier approach as presented in [Table 2.1](#).
- 2.2.2.11 During Tier 1 checking, linear regression of the minute average measurements from the sensors and the TS should be performed. The slope and coefficient of determination (R²)

from the linear regression should be calculated and meet the target values in [Table 2.1](#). If these criteria are not met due to narrow range of PM concentration ($>30 \mu\text{g}/\text{m}^3$ and $>25 \mu\text{g}/\text{m}^3$ as recommended span range for RSP and FSP, respectively) during the collocation period, the Tier 2 checking on mean squared error shall be determined and compared against the target value in [Table 2.1](#). If the monitoring equipment fails to meet both Tiers 1 and 2 target values, the monitoring equipment needs to be re-calibrated or replaced.

- 2.2.2.12 The collocated monitoring of TS and each air sensor on the field should be carried out every month. If a sensor failed in 3 consecutive collocated monitoring, the sensor should be checked or maintained to improve its performance, or it should be replaced.

Construction Dust Monitoring Plan

- 2.2.2.13 Before commencing the air monitoring, the ET should formulate a construction dust monitoring plan with air sensor and submit to IEC to seek their feedback and consent. The plan should be aligned with the EM&A Manual and verified by IEC. The plan should include but not limited to the followings:

- Details on the pollutants and environmental parameters to be monitored;
- Describe the equipment and measurement method to be used;
- Address the criteria for placing air sensors;
- Discuss the monitoring locations selected and rationale;
- Describe the criteria for selecting air sensors and test to determine if they are working properly;
- Determine the collocation location and establish the calibration and/or collocation and data correction methods;
- Identify types of data that may be used in the data analysis, including nearby reference monitor data, weather data, etc.
- List the procedures to maintain and operate air sensors, including site visits, routine maintenance, emergency maintenance, daily data review, periodic collocations, etc.;
- Describe the QC procedures to be performed;
- Describe how the data are processed, stored and adjusted;
- Describe the ownership of the data and who is granted access to it;
- Describe how the air monitoring data to be managed, tracing the path of data generation in the field to the final data use and end storage;
- Describe the procedures to verify and validate data during collection period;
- Describe the methods to produce meaningful figures and visualization;
- Describe how the monitoring results will be used.

- 2.2.2.14 The ET is responsible for the provision of the monitoring equipment and should provide sufficient number of air sensors for the field work and TS for carrying out continuous on-site monitoring and ad-hoc monitoring.

Wind Data Monitoring Equipment

- 2.2.2.15 Wind data monitoring equipment should 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 should be proposed by the ET and agreed with the ER in consultation with the IEC. For installation and operation of wind data monitoring equipment, the following points should be observed:

- the wind sensors should 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 should be captured by a data logger. The data recorded in the data logger should be downloaded periodically for analysis at least once a month;
- the wind data monitoring equipment should be re-calibrated at least once every six months; and
- wind direction should be divided into 16 sectors of 22.5 degrees each.

- 2.2.2.16 In exceptional situations, the ET may propose alternative methods to obtain representative wind data upon approval from the ER and agreement from the IEC.
- 2.2.2.17 If the ET Leader proposes alternative dust monitoring equipment / methodology after the approval of this Manual, agreement from the IEC and EPD should be sought. The instrument should also be calibrated regularly following the requirements specified by the equipment manufacturers.

2.2.3 Laboratory Measurement / Analysis (For TSP Measurement only)

- 2.2.3.1 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.
- 2.2.3.2 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.
- 2.2.3.3 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.
- 2.2.3.4 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.
- 2.2.3.5 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.
- 2.2.3.6 All the collected samples shall be kept in a good condition for 6 months before disposal.

2.2.4 Dust Monitoring Stations

- 2.2.4.1 The selected monitoring locations are air sensitive receivers located in the vicinity of construction sites and covered different wind directions to capture the potential worst-case impact from the construction of the Project. The proposed dust monitoring locations during construction phase are listed in [Table 2.2](#) and are illustrated in [Figure 2.1](#). The ET should agree with IEC on the position of the air sensor for installation. The considerations for the positioning of air sensor refer to [Section 2.2.2.13](#), the construction dust monitoring plan with sensors and the feedbacks from IEC and EPD.

Table 2.2 Proposed Dust Monitoring Stations

Monitoring Station No. ^[1]	ASR ID in EIA Report	ASR Description	Approx. Distance from the Nearest Project Site Boundary (m)
AM1	A7	North Lantau Refuse Transfer Station Office	65
AM2	A8	Organic Waste Treatment Facilities Main Building	165
AM3	A11	Discovery Bay Tunnel Administration Building	185
AM4	A3	7 Luk Keng Tsuen	390
AM5	A6	Village House	305
AM6	A1	Lantau Toll Plaza Administration Building	155
AM7	A13	Proposed Development atop Siu Ho Wan Depot (Phase 1)	5

Note:

[1] Continuous hourly RSP and FSP monitoring should be conducted at the monitoring stations when there are Project-related major construction activities including site formation, excavation or piling works being undertaken within a radius of 500m from the monitoring stations.

2.2.4.2 The status and locations of air monitoring locations may change after this Manual is issued. In such case, the ET should propose alternative monitoring locations and seek agreement from the IEC and EPD.

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

- Monitoring at ASRs close to the major site activities which are likely to have air quality impacts;
- Monitoring as close as possible to the ASRs as defined in the EIAO-TM;
- Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring; and
- Take into account the prevailing meteorological conditions.

2.2.4.4 The ET should agree with IEC on the position of the HVS and PM sensors for installation of the monitoring equipment. When positioning the HVS/the PM sensors, the following points should be noted:

- A horizontal platform with appropriate support to secure the HVS/the PM sensors against gusty wind should be provided;
- general housekeeping, cleaning works and other preventative maintenance activities such as checking the operating status of individual monitoring equipment should be carried out to ensure the proper operation of the system;
- the distance between the HVS/the PM sensors and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the HVS/the PM sensors;
- a minimum of 2m separation from walls, parapets and penthouses is required for rooftops samplers;
- a minimum of 2m separation from any supporting structure, measures horizontally is required;
- no furnace or incinerator flue is located nearby;
- airflow around the sampler is unrestricted;
- the sampler is more than 20m from the dripline;
- any wire fence and gate to protect the HVS/the PM sensors, should not cause any obstruction during monitoring;
- permission must be obtained to set up the HVS/the PM sensors and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the HVS/the PM sensors.

2.2.4.5 Subject to site conditions and monitoring results, the ET Leader, with IEC and EPD endorsement, may decide whether additional monitoring locations should be included or any monitoring locations could be removed / relocated during the construction phase.

2.2.5 Baseline Monitoring (for TSP only)

2.2.5.1 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.

2.2.5.2 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.

- 2.2.5.3 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 2.3](#).
- 2.2.5.4 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.
- 2.2.5.5 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.
- 2.2.5.6 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.

2.2.6 Impact Monitoring

- 2.2.6.1 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. For 1-hour RSP and 24-hour RSP, and 24-hour FSP monitoring, continuous monitoring should be carried out by air sensors throughout the construction phase. The impact monitoring programme is summarized in [Table 2.3](#).
- 2.2.6.2 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 2.3 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
Impact Monitoring	Throughout the construction phase	1-hour RSP	Continuous monitoring
Impact Monitoring	Throughout the construction phase	24-hour RSP	Continuous monitoring
Impact Monitoring	Throughout the construction phase	24-hour FSP	Continuous monitoring

2.2.7 Event and Action Plan

2.2.7.1 The ET shall compare the impact monitoring results with air quality criteria set up for RSP and FSP. [Table 2.4](#) 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 [Tables 2.5 and 2.6](#) shall be carried out. The action and limit level may subject to the change based on the prevailing AQOs implemented at the time of the dust monitoring works.

Table 2.4 Action and Limit Levels for Air Quality (Dust)

Parameter	Action Level	Limit Level
1-hour TSP	BL ≤ 384 µg/m ³ , AL = (BL * 1.3 + LL)/2 BL > 384 µg/m ³ , AL = LL	500 µg/m ³
1-hour RSP	128 µg/m ³	Not Applicable
24-hour RSP (rolling average)	Not Applicable	75 µg/m ³
24-hour FSP (rolling average)	Not Applicable	37.5 µg/m ³

Note:

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

Table 2.5 Event and Action Plan for Construction Air Quality Impact (TSP monitoring)

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Notify Contractor. 	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; and 4. Amend proposal as appropriate.
Limit level being exceeded by one sampling	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform Contractor, IEC, ER, and EPD; 3. Repeat measurement to confirm findings; 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 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.

Event	Action			
	ET	IEC	ER	Contractor
Limit level being exceeded by two or more consecutive sampling	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.

Table 2.6 Event and Action Plan for Construction Air Quality Impact (RSP and FSP monitoring)

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sample	<ol style="list-style-type: none"> 1. Notify IEC and ER; 2. Check the monitoring data and error messages to confirm if the performance of the monitoring equipment is normal; 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; and 4. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops. 	<ol style="list-style-type: none"> 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 ER and ET on the effectiveness of the proposed remedial measures; and 5. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with IEC and ET, agree with the Contractor on the remedial measures to be implemented; and 4. Ensure remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Identify sources of exceedance and discuss with ER, ET and IEC on possible remedial measures; 2. Implement remedial measures; and 3. Amend working methods if appropriate.
Action level exceedance for two or more consecutive samples	<ol style="list-style-type: none"> 1. Notify IEC and ER; 2. Check the monitoring data and the performance of the monitoring equipment (refer to Section 2.2.2.9 and Table 2.1); 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; 4. Discuss with IEC and Contractor on possible remedial measures required; 5. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops; and 6. Notify EPD if the exceedance is confirmed to be related to the Project. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method and verify the performance of the monitoring equipment to be checked by ET (refer to Section 2.2.2.9 and Table 2.1); 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise ER and ET on the effectiveness of the proposed remedial measures; and 5. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with IEC and ET, agree with the Contractor on the proposal for remedial measures to be implemented; and 4. Ensure the proposal for remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Identify the sources and discuss with ER, ET and IEC on possible remedial measures; 2. Submit a proposal for remedial measures to ER, IEC and ET within 2 working days of notification of exceedance for agreement; 3. Implement the agreed proposal; and 4. Amend proposal if appropriate.
Limit level exceedance for one 24-hr rolling average RSP concentration record or/and one 24-hr rolling average FSP concentration record	<ol style="list-style-type: none"> 1. Notify IEC, ER, Contractor and EPD; 2. Check the monitoring data and the performance of the monitoring equipment (refer to Section 2.2.2.9 and Table 2.1); 3. If exceedance is confirmed, identify source(s), investigate the causes of exceedance and propose remedial measures; 4. Discuss with IEC, ER and Contractor on possible remedial measures required; 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; and verify the performance of the monitoring equipment to be checked by ET (refer to Section 2.2.2.9 and Table 2.1); 3. Discuss with ER, ET and Contractor on the possible remedial measures; 4. Advise ER and ET on the effectiveness of the proposed remedial measures; 5. Review Contractor's remedial measures whenever necessary to assure their 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. In consultation with the IEC and ET, agree with the Contractor on the proposal for remedial measures to be implemented; 4. Ensure the proposal for remedial measures are properly implemented; and 5. If exceedance continues, identify what portion of the work is responsible and 	<ol style="list-style-type: none"> 1. Identify the sources and discuss with ER, ET and IEC on possible remedial measures; 2. Take immediate action to avoid further exceedance; 3. Submit a proposal for remedial measures to ER, IEC and ET within 2 working days of notification of exceedance for agreement; 4. Implement the agreed proposal; 5. Review and resubmit proposals if the problem is still not under control; and

Event	Action			
	ET	IEC	ER	Contractor
	5. Assess effectiveness of Contractor's remedial measures and keep IEC and ER informed of the results until exceedance stops; and 6. Notify EPD if the exceedance is confirmed to be related to the Project.	effectiveness and advise ER and ET accordingly; and 6. Supervise the implementation of remedial measures	instruct the Contractor to stop that portion of work until the exceedance is abated.	6. Stop the relevant portion of works as determined by ER until the exceedance is abate

2.3 Mitigation Measures

- 2.3.1.1 Mitigation measures for construction phase air quality impacts and appropriate design for minimizing potential operational odour impact have been recommended in the EIA Report. All the recommended mitigation measures and designs are detailed in the implementation schedule in [Appendix B](#). The Contractor should be responsible for the design and implementation of these measures.

2.4 Audit Requirements

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

3. NOISE

3.1 Introduction

- 3.1.1.1 The EIA Report has assessed the potential construction noise impact and operational road traffic noise impact from the Project.
- 3.1.1.2 Recommendations on construction noise mitigation measures have been presented in the EIA to mitigate noise impact. A noise monitoring and audit programme is recommended to be undertaken to confirm the proposed mitigation measures have been implemented properly.
- 3.1.1.3 Low noise road surfacing will be provided for the proposed road sections with design speed of 70km/h or above as the standard surfacing material in accordance with RD/GN/032. Direct mitigation measures including vertical noise barrier and cantilevered noise barrier would be required along the roadworks within the Project area to alleviate traffic noise impact. Road traffic noise levels should be monitored at representative noise sensitive receivers (NSRs), which are in vicinity of the recommended direct mitigation measures, during the first year after road opening. The purpose of traffic noise monitoring is to ascertain that the recommended mitigation measures are effective in reducing noise levels.
- 3.1.1.4 In this section, the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of noise impacts during construction phase of the Project are presented.

3.2 General Monitoring Requirement and Equipment

- 3.2.1.1 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.
- 3.2.1.2 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.
- 3.2.1.3 The Environmental Team (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 Environmental Protection Department (EPD).
- 3.2.1.4 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 Construction Noise Monitoring

3.3.1 Monitoring Parameters for Construction Noise

- 3.3.1.1 The construction noise levels should be measured in terms of the 30-minute A-weighted equivalent continuous sound pressure level (Leq (30-min)). Leq (30-min) should be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays.
- 3.3.1.2 Supplementary information for data auditing and statistical results such as L10 and L90

should also be obtained for reference. Sample noise field data sheets are shown in [Appendix 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.

3.3.2 Monitoring Locations for Construction Noise

3.3.2.1 Based on the noise assessment results in the EIA Report, noise exceedances are predicted under the unmitigated scenario, whereas no noise exceedance would be predicted under the mitigated scenario. [Figure 3.1](#) shows the proposed construction phase noise monitoring stations. Details of the proposed noise monitoring stations are summarized in [Table 3.1](#).

Table 3.1 Proposed Construction Noise Monitoring Stations

Noise Monitoring Point	EIA ID	Location	Monitoring Period
CM1	PN1-T1-02	Planned Residential Development atop Siu Ho Wan Depot Phase 1	24-hour
CM2	PN1-T15-01	Planned Residential Development atop Siu Ho Wan Depot Phase 1	24-hour
CM3	PN1-T25-01	Planned Residential Development atop Siu Ho Wan Depot Phase 1	24-hour

3.3.2.2 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.

3.3.2.3 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.

3.3.3 Baseline Monitoring for Construction Noise

3.3.3.1 Baseline noise monitoring shall be carried out daily at all of the proposed 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.

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

3.3.3.3 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.

3.3.4 Impact Monitoring for Construction Noise

3.3.4.1 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.

3.3.4.2 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.

3.3.4.3 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.

3.3.5 Event and Action Plan for Construction Noise

3.3.5.1 The Action and Limit levels for construction noise are defined in [Table 3.2](#). Should non-compliance of the criteria occur, action in accordance with the Action Plan in [Table 3.3](#) shall be carried out.

Table 3.2 Action and Limit Levels for Construction Noise

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

Notes:

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

Table 3.3 Event and Action Plan for Construction Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC; and 2. Implement noise mitigation proposals.
Limit Level	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 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. 	<ol style="list-style-type: none"> 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.

3.4 Operation Road Traffic Noise Monitoring

3.4.1 Noise Parameters for Operation Road Traffic Noise

3.4.1.1 The ET should carry out monitoring of road traffic noise after the works under Contract are completed and upon commencement of operation of the Project. The noise monitoring should be carried out during the first year of the operation phase. The road traffic noise during operation of the Project should be measured in terms of the A-weighted equivalent of L_{10} (1-hr). During the traffic noise measurement, traffic count including traffic volume, percentage of heavy vehicles as defined in Calculation of Road Traffic Noise (CRTN) and traffic speed should also be undertaken concurrently. Supplementary information for data auditing and statistical results such as L_{eq} and L_{90} should also be obtained for reference.

3.4.1.2 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.

3.4.2 Monitoring Locations for Operation Road Traffic Noise

3.4.2.1 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](#). 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 Proposed Road Traffic Noise Monitoring Stations

Monitoring Station ID	NSR ID no. in EIA Report	Location	Proposed Mitigation Measures Nearby
OM1	PN2-T26-01	Planned Residential Development atop Siu Ho Wan Depot Phase 2	Semi Noise Enclosure (SE1), 5.5m (H) Noise Barrier with 3.5m cantilever at 45 degrees (N1 & N2)
OM2	PN2-T34-01	Planned Residential Development atop Siu Ho Wan Depot Phase 2	5m (H) Noise Barrier with 1m cantilever at 45 degrees (N3)
OM3	PN2-T37-01	Planned Residential Development atop Siu Ho Wan Depot Phase 2	3.5m (H) Noise Barrier with 1m cantilever at 45 degrees (N4)
OM4	PN3-T51-01	Planned Residential Development atop Siu Ho Wan Depot Phase 3	5m (H) Vertical Noise Barrier (N5)
OM5	PN4-B-01	Planned Residential Development atop Siu Ho Wan Depot Phase 4	5m (H) Vertical Noise Barrier (N6)
OM6	PN4-F-01	Planned Residential Development atop Siu Ho Wan Depot Phase 4	6m (H) Vertical Noise Barrier (N7)

3.4.2.2 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.

3.4.2.3 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.

3.4.3 Impact Monitoring for Operation Road Traffic Noise

3.4.3.1 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.

3.4.3.2 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.

3.4.3.3 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.

3.4.3.4 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.

3.4.4 Event and Action Plan for Road Traffic Noise

3.4.4.1 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.

3.5 Mitigation Measures

3.5.1 Construction Phase

3.5.1.1 No adverse noise impact from construction activities of the Project would be anticipated with the implementation of mitigation measures such as the use of Quality Powered Mechanical Equipment (QPME), quiet construction methods, good site practices, etc. The implementation schedule of the recommended mitigation measures and good site practices is presented in [Appendix B](#).

3.5.1.2 A Construction Noise Management Plan (CNMP) should be prepared during the pre-tender stage, and before commencement of construction works of the Project, to verify the inventory of noise sources, assess the effectiveness and practicality of all identified measures for mitigating the construction noise impact of the Project, and to demonstrate that the quiet construction methods and equipment can be duly specified and implemented for the corresponding noisy construction activities.

3.5.2 Operation Phase

3.5.2.1 Direct noise mitigation measures including semi-enclosure and vertical/cantilevered noise barriers have been proposed to alleviate traffic noise impact.

3.5.2.2 The feasibility, practicability, programming, and effectiveness of the noise mitigation

measures have been reviewed and confirmed by Project Engineer. A Road Traffic Noise Mitigation Plan, taking into account the latest design of the planned NSRs at Siu Ho Wan, should be submitted to review the necessary noise mitigation measures before the commencement of construction of the Project.

- 3.5.2.3 The implementation schedule for the recommended mitigation measures is presented in [Appendix B](#).

3.6 Audit Requirements

- 3.6.1.1 Regular site environmental audit during the construction phase of the Project should be conducted at least once per week by the Contractor and ET to ensure proper implementation of mitigation measures and good site practices as listed in [Appendix B](#) by the Contractor.
- 3.6.1.2 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

4.1.1.1 Potential water quality impacts arising from the construction and operational phases of the Project were identified and assessed in the EIA Report. No adverse water quality impacts from the Project would be anticipated during the construction phase of the Project with the implementation of recommended mitigation measures. Water quality monitoring and audit is recommended during the construction phase to ensure that all the recommended mitigation measures are properly implemented.

4.1.1.2 As no adverse hydrodynamic and water quality impacts due to the reclamation were predicted during the operational phase, no mitigation measures are necessary. While the operation of the Project would generate non-point source surface runoff from the proposed new roads and cycle track / footpath, the impacts on water quality are assessed to be minimal and no adverse impacts would be anticipated with the implementation of proper drainage system and mitigation measures. Additionally, sufficient number of public toilet facilities (operated and maintained by Food and Environmental Hygiene Department and connected to public sewerage system) are already provided in areas connected to the proposed cycle track / footpath, no water quality impact from sewage generated by visitors would be anticipated. Therefore, no monitoring programme specific to the operational phase of the Project is deemed necessary.

4.2 Construction Phase Water Quality Monitoring

4.2.1 Water Quality Parameters

4.2.1.1 Dissolved oxygen (DO), dissolved oxygen saturation (DO%), temperature, turbidity, salinity, pH and suspended solids (SS) should be monitored at designated marine water quality monitoring stations as specified in [Section 4.2.4](#) during the marine works of the Project. All parameters should be measured in-situ whereas SS should be determined by the laboratory. DO should be presented in mg/L and in % saturation. Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database. [Table 4.1](#) summarises the water quality monitoring parameters and programme during the construction phase.

4.2.1.2 Other relevant data shall also be recorded, including monitoring location / position, time, water depth, tidal stages, weather conditions and any special phenomena or work activities undertaken around the monitoring and works area that may influence the monitoring results. A sample data record sheet is shown in [Appendix C](#) for reference.

Table 4.1 Proposed Marine Water Quality Monitoring Parameters and Programme during the Construction Phase

Monitoring Event	Parameters	Monitoring Period	Frequency and Interval	Monitoring Location
Baseline Monitoring	<u>In-situ measurement</u> Dissolved Oxygen (DO) (mg/L), DO saturation (%), Temperature (°C), pH, Turbidity (NTU),	At least 4 weeks prior to the commencement of marine construction works	<u>Monitoring frequency</u> At both mid-flood and mid-ebb tides for a minimum 3 days a week	M1, M2, M3, C1, C2
Impact Monitoring	Salinity (ppt) <u>Laboratory measurement</u> Suspended Solids (SS) (mg/L)	During the marine construction works period	<u>Interval between two sets of monitoring</u> Not less than 36 hours	

4.2.2 Sampling Procedures and Monitoring Equipment

Dissolved Oxygen and Temperature Measuring Equipment

4.2.2.1 The instrument shall be a portable and weatherproof DO measuring instrument complete with cable and sensor, and use a DC power source. The equipment shall be capable of measuring:

- a DO level in the range of 0 – 20 mg/L and 0 – 200% saturation; and
- a temperature of 0 - 45 degree Celsius.

4.2.2.2 It shall have a membrane electrode with automatic temperature compensation complete with a cable. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary. For example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument.

4.2.2.3 Shall salinity compensation not be built-in to the DO equipment, in-situ salinity shall be measured to calibrate the DO equipment prior to each DO measurement.

Turbidity Measurement Instrument

4.2.2.4 Turbidity shall be measured in-situ by the nephelometric method. The instrument shall be portable and weatherproof turbidity measuring instrument using a DC power source complete with cable, sensor and comprehensive operation manuals. It shall have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU (for example, Hach model 2100P or an approved similar instrument). The cable shall not be less than 25m in length. The meter shall be calibrated to establish the relationship between NTU units and the levels of suspended solids. The turbidity measurement should be carried out on split water sample collected from the same depths of suspended solids samples.

Salinity

4.2.2.5 A portable salinometer capable of measuring salinity in the range of 0 - 40 parts per thousand (ppt) shall be provided for measuring salinity of the water at each monitoring location.

pH

4.2.2.6 The instrument shall consist of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It shall be readable to 0.1 pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 shall be used for calibration of the instrument before and after use. Details of the method shall comply with American Public Health Association (APHA), 19th ed. 4500-HTB.

Sampler

4.2.2.7 A water sampler is required. It shall comprise a transparent Polyvinyl Chloride (PVC) cylinder, with a capacity of not less than 2 liters, which can be effectively sealed with latex cups at both ends. The sampler shall have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth (for example, Kahlsico Water Sampler or an approved similar instrument).

Water Depth Detector

4.2.2.8 A portable, battery-operated echo sounder shall be used for the determination of water depth at each designated monitoring station. This unit can either be hand held or affixed to the bottom of the work boat, if the same vessel is to be used throughout the monitoring programme.

Sample Containers and Storage

4.2.2.9 Water samples shall be stored in high density polythene bottles with no preservative added, packed in ice (cooled to 4°C without being frozen) and delivered to the laboratory and analyzed as soon as possible after collection. Sufficient volume of samples shall be collected to achieve the required detection limit.

Monitoring Position Equipment

4.2.2.10 A hand-held or boat-fixed type digital Differential Global Positioning System (DGPS) with way point bearing indication or other equipment instrument of similar accuracy, shall be provided and used during marine water monitoring to ensure the monitoring vessel is at the correct

location before taking measurements.

Calibration of In-Situ Instruments

- 4.2.2.11 All in-situ monitoring instruments shall be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use and subsequently re-calibrated at three monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes shall be checked with certified standard solutions before each use. Wet bulb calibration for a DO meter shall be carried out before measurement at each monitoring location.
- 4.2.2.12 Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

4.2.3 Laboratory Measurement / Analysis

- 4.2.3.1 Analysis of SS level should be carried out in a HOKLAS or other international accredited laboratory. Sufficient water samples should be collected at the monitoring stations for carrying out the laboratory SS determinations. All samples should be assigned a unique code and accompanied by Chain of Custody (COC) sheets. The SS determination work should start within 24 hours after collection of the water samples. The analyses should follow the American Public Health Association (APHA) Standard Methods for the Examination of Water and Wastewater or an equivalent method subject to the approval of EPD. The suggested testing method and lowest detection limit are provided in [Table 4.2](#).

Table 4.2 Laboratory Analysis

Determinant	Analytical Method	Detection Limit
Suspended Solids	APHA 22ed 2540 D & E	0.5 mg/L

- 4.2.3.2 The testing of SS should be HOKLAS accredited (or if not, approved by EPD) and comprehensive quality assurance and control procedures in place in order to ensure quality and consistency in results.
- 4.2.3.3 Detailed testing methods, pre-treatment procedures, instruments use, Quality Assurance / Quality Control (QA/QC) details (such as blank, spike recovery, number of replicate samples per batch, etc.), detection limit and accuracy shall be submitted to EPD for approval prior to the commencement of monitoring programme. EPD may also request the laboratory to carry out analysis of known standards provided by EPD for quality assurance. The QA / QC shall be in accordance with the requirements of HOKLAS or international accredited scheme. The QA/ QC results shall be reported. The testing methods and related proposal should be checked and certified by IEC before submission to EPD for approval.
- 4.2.3.4 Additional duplicate samples may be required by EPD for inter laboratory calibration. Remaining samples after analysis should be kept by the laboratory for 3 months in case repeat analysis is required. If in-house or non-standard methods are proposed, details of the method verification may also be required to submit to EPD. In any circumstance, the sample testing should have comprehensive quality assurance and quality control programmes. The laboratory should prepare to demonstrate the programme to EPD or EPD’s representatives when requested.

4.2.4 Water Quality Monitoring Stations

- 4.2.4.1 The proposed water quality monitoring stations are listed in [Table 4.3](#) and shown in [Figure 4.1](#). The monitoring stations proposed in this section are indicative subject to further review before commencement of the water quality monitoring works. The status and locations of water quality monitoring stations and the works activities may change after issuing this Manual. For such occasion, the ET Leader shall propose with justification for changes to monitoring locations or other requirements of the EM&A programme, taking into account the following considerations and seek approval from the IEC and EPD:

- (i) close to the sensitive receivers which are directly or likely to be affected;

- (ii) for monitoring locations located in the vicinity of the sensitive receivers, care shall be taken to cause minimal disturbance during monitoring; and
- (iii) two or more control stations which shall be at locations representative of the project site in its undisturbed condition. Control stations shall be located, as far as is practicable, both upstream and downstream of the works area.

Table 4.3 Proposed Marine Water Quality Monitoring Stations

Monitoring Station	Description	Easting	Northing
M1	Impact Station	816039.7	819041.3
M2	Impact Station	816561.6	819459.6
M3	Impact Station	817310.5	819774.3
C1	Control Station	815787.3	820057.1
C2	Control Station	816976.1	820520.8

4.2.5 Monitoring Requirements

4.2.5.1 Baseline and impact monitoring shall be conducted. The following requirements should be followed for baseline, impact and post-construction monitoring:

- Measurement should be taken at 3 water depths, namely, 1m below water surface, mid-depth and 1m above sea bed, except where the water depth less than 6m, the mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station will be monitored. The ET should agree with EPD on all the monitoring stations.
- Duplicate in-situ measurements and water samples collected from each independent monitoring event are required for all parameters to ensure a robust statistically interpretable dataset.
- No sampling should be carried out when typhoon signal No. 3 or above or black rainstorm signal is hoisted.
- At each measurement depth, two consecutive measurements would be taken. The probes would be retrieved out of the water after the first measurement and then redeployed for the second measurement. When the difference in value between the first and second measurement of on-site parameters is more than 25% of the value of the first reading, the reading shall be discarded and further readings shall be taken.

Baseline Monitoring

4.2.5.2 Baseline conditions of water quality should be established by the ET and agreed with IEC and EPD. The purposes of the baseline monitoring are to establish ambient conditions prior to the commencement of the marine construction works, to demonstrate the suitability of the proposed control and impact monitoring stations, and for establishment of the action and limit levels. The baseline monitoring report should be submitted to EPD at least 2 weeks before the commencement of marine construction works for agreement. The baseline monitoring report should be certified by the ET Leader and verified by IEC before submission to EPD.

4.2.5.3 The baseline conditions should be established by measuring the water quality parameters as specified in [Section 4.2.1](#) at the designated monitoring stations as shown in [Figure 4.1](#) (see [Table 4.3](#)). The measurements should be taken at all designated monitoring stations including control stations, 3 days a week, at mid-flood and mid-ebb tides, for a period of 4 weeks prior to the commencement of marine works. The interval between two sets of monitoring shall not be less than 36 hours, and the baseline monitoring schedule shall be submitted to DEP and IEC at least two weeks prior to the commencement of the baseline monitoring. EPD shall also be notified immediately for any changes in schedule.

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

Impact Monitoring

4.2.5.5 The impact monitoring shall be conducted during the construction period. The purpose of impact monitoring is to ensure the suitability of the recommended mitigation measures. During the marine construction works of the Project, impact monitoring shall be undertaken

3 days per week, at mid-flood and mid-ebb tides, with sampling/measurement at all the designated monitoring stations including control stations as listed in [Table 4.2](#) and depicted in [Figure 4.1](#). The interval between 2 sets of monitoring should not be less than 36 hours except where there are project-related exceedances of Action and/or Limit levels, in which case the monitoring frequency will be increased. The monitoring parameters, monitoring stations and monitoring requirements shall follow those specified in [Sections 4.2.1, 4.2.4](#) and [4.2.5](#), respectively. Duplicate water samples should be taken and analysed.

4.2.5.6 If the impact monitoring data collected at the impact monitoring stations (i.e. Stations M1, M2 and M3) indicate that the Action or Limit levels as shown in [Table 4.4](#) are exceeded, analysis should be conducted to identify whether the exceedance is caused by Project activities. If the data analysis results indicate that the exceedance is caused by this Project, appropriate actions including lowering the working rate, or rescheduling of works should be taken and additional mitigation measures should be implemented as necessary.

4.2.6 Event and Action Plan

4.2.6.1 The Action and Limit (AL) Levels for water quality are defined in [Table 4.4](#). The actions in accordance with the Event and Action Plan in [Table 4.5](#) should be carried out if the defined Action and/or Limit levels for water quality are exceeded at any designated monitoring points.

Table 4.4 Action and Limit Levels for Marine Water Quality

Parameters	Action	Limit
DO in mg/L (Surface, Middle & Bottom) ^b	<p><u>Surface & Middle</u> 5%-ile of baseline data for surface and middle layer.</p> <p><u>Bottom</u> 5%-ile of baseline data for bottom layer.</p>	<p><u>Surface & Middle</u> 4 mg/L, except 5 mg/L for FCZ, or 1%-ile of baseline data for surface and middle layer</p> <p><u>Bottom</u> 2 mg/L or 1%-ile of baseline data for bottom layer</p>
SS in mg/L (depth-averaged ^a) ^c	95%-ile of baseline data or 120% of upstream control station's SS recorded at the same tide on the same day	99%-ile of baseline data or 130% of upstream control station's SS recorded at the same tide on the same day and specific sensitive receiver water quality requirements
Turbidity in NTU (depth-averaged ^a) ^c	95%-ile of baseline data or 120% of upstream control station's turbidity recorded at the same tide on the same day	99%-ile of baseline data or 130% of upstream control station's turbidity recorded at the same tide on the same day

Notes:

- a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths
- b. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.
- c. For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Table 4.5 Event and Action Plan for Marine Water Quality Monitoring

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling day	<ol style="list-style-type: none"> Repeat in situ measurement on the next day of exceedance to confirm findings; Check monitoring data, plant, equipment and Contractor(s)'s working methods; Identify source(s) of impact and record in notification of exceedance; and Inform IEC, Contractor(s) and ER 	<ol style="list-style-type: none"> Check monitoring data submitted by ET and Contractor(s)'s working methods; and Inform EPD and AFCD. 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; and Check plant and equipment and rectify unacceptable practice
Action level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> Repeat in situ measurement on the next day of exceedance to confirm findings; Check monitoring data, plant, equipment and Contractor(s)'s working methods; Identify source(s) of impact and record in notification of exceedance; Inform IEC, Contractor(s) and ER; and Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented. 	<ol style="list-style-type: none"> Check monitoring data submitted by ET and Contractor(s)'s working methods; Inform EPD and AFCD; Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; and Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented; and Ensure additional mitigation measures are properly implemented. 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Check plant and equipment and rectify unacceptable practice; Consider changes of working methods; Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; and Implement the agreed mitigation measures.
Limit level being exceeded by one sampling day	<ol style="list-style-type: none"> Repeat in situ measurement on the next day of exceedance to confirm findings; Check monitoring data, plant, equipment and Contractor(s)'s working methods; Identify source(s) of impact and record in notification of exceedance; Inform IEC, Contractor(s) and ER; and Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented. 	<ol style="list-style-type: none"> Check monitoring data submitted by ET and Contractor(s)'s working methods; Inform EPD and AFCD; Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; and Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented; Ensure additional mitigation measures are properly implemented; and Request Contractor(s) to critically review the working methods. 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Check plant and equipment and rectify unacceptable practice; Critically review the need to change working methods; Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; and Implement the agreed mitigation measures.
Limit level being exceeded by two or more consecutive sampling days	<ol style="list-style-type: none"> Repeat in situ measurement on the next day of exceedance to confirm findings; Check monitoring data, plant, equipment and Contractor(s)'s working methods; Identify source(s) of impact and record in notification of exceedance; Inform IEC, Contractor(s) and ER; and Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented. 	<ol style="list-style-type: none"> Check monitoring data submitted by ET and Contractor(s)'s working methods; Inform EPD and AFCD; Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; and Assess the effectiveness of the implemented mitigation measures. 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented; Ensure additional mitigation measures are properly implemented; and Request Contractor(s) to critically review the working methods. 	<ol style="list-style-type: none"> Confirm receipt of notification of exceedance in writing; Check plant and equipment and rectify unacceptable practice; Critically review the need to change working methods; Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; and Implement the agreed mitigation measures.

4.3 Mitigation Measures

- 4.3.1.1 Mitigation measures for construction phase water quality impacts have been recommended in the EIA Report. The recommended mitigation measures are detailed in the implementation schedule given in [Appendix B](#). The Contractor should be responsible for the design and implementation of the mitigation measures.

4.4 Audit Requirement

- 4.4.1.1 Regular site audit should be conducted by the Contractor and ET at least once per week to ensure that the recommended mitigation measures for water quality impacts are properly implemented by the Contractor during the construction phase of the Project.

5. WASTE MANAGEMENT

5.1 Introduction

- 5.1.1.1 Construction and Demolition (C&D) materials, excavated sediment, general refuse and floating refuse from workforce, and chemical waste would be generated during the construction phase. It is the contractor's responsibility to ensure that any wastes produced during the construction and demolition works 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 anticipated.
- 5.1.1.2 During the operational phase, no adverse environmental impacts would be anticipated with the implementation of good waste management practices. EM&A programme for the operational phase of the Project would not be required.

5.2 Mitigation Measures

- 5.2.1.1 The mitigation measures for waste management recommended in the EIA Report should form the basis of the Waste Management Plan (WMP) to be developed by the Contractor during the construction stage. [Appendix B](#) provides the implementation schedule of the recommended mitigation measures during both the construction and operational phases.
- 5.2.1.2 The 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 licences, 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.

5.3 Audit Requirement

- 5.3.1.1 Regular audits and site inspections at least once per week should be carried out during the construction phase by the ET and Contractor to ensure that the recommended good site practices and mitigation measures detailed 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.
- 5.3.1.2 The requirements of the environmental audit programme are set out in [Section 12](#) of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

6. LAND CONTAMINATION

6.1 Introduction

- 6.1.1.1 The potentially contaminating land uses within the assessment area has been examined through a site appraisal, in the form of desktop review and site walkover, in the EIA Report. Based on the site appraisal, a total of 2 facilities / areas (Former HyD Site Office (Site CS-7) and LCSD Depot (Site CS-8)) were identified with potential land contamination concerns to the Project within the Project Area. A sampling and testing programme targeting the concerned facility had been proposed. A total of 5 sampling locations were proposed for soil and groundwater sample collection.
- 6.1.1.2 In view of the site status and/or accessibility, it is considered not appropriate / feasible to carry out SI works under the EIA Study. Moreover, there were existing antennas (Site TF-4 and TF-5) which were inaccessible at the time of site walkover. Based on the tentative construction programme, construction works for the Project will not commence until 2027, there could be changes in the operation or changes in land use within the 2 concerned facilities / areas and Project Area which may cause further contamination issues.

6.2 Mitigation Measures

- 6.2.1.1 Site re-appraisal should be carried out for the whole Project Area at a later stage of the Project in order to address any new contamination issues caused by the (i) changes in operation within the 2 concerned facilities / areas and (ii) changes in land use within the Project Area. The submission of supplementary CAP(s), associated SI works and any necessary remediation should be carried out prior to the commencement of construction works at the concerned facilities / areas and any new contaminated area identified in the site re-appraisal.
- 6.2.1.2 The site re-appraisal and submission of supplementary CAP(s) should be carried out prior to the commencement of the SI works. Supplementary CAP(s), presenting findings of the review, the latest site conditions of the concerned facility / new contaminated area and updated sampling strategy and testing protocol, should be submitted to EPD for endorsement. The SI works should be carried out according to EPD's agreed supplementary CAP(s). Following the completion of SI works and receipt of laboratory test results, CAR(s) should be prepared to present the findings of the SI works and to discuss the presence, nature and extent of contamination. If contamination is identified, RAP(s) which provides details of the remedial actions for the identified contaminated soil and / or groundwater should be endorsed by EPD. The remedial actions should be formulated with consideration given to the Source-Pathway-Receptor Paradigm by adopting the appropriate control method(s) (i.e. source control method, pathway control method and/or receptor control method). If remediation is required and where appropriate, "pathway control" approach, e.g. by proper capping the source of contamination by soil or concrete slabs or by the use of membranes or solidification, would be considered to prevent migration of contaminants with a view to minimising the cost of remediation work.
- 6.2.1.3 Remediation works, if necessary, would be carried out after decommissioning of concerned facilities / areas but prior to the construction works at the concerned facilities / areas. Mitigation measures for the remediation works, if necessary, as recommended in the EIA Report, [Appendix B](#) of this Manual and future RAP(s) should be implemented during the remediation works.

6.3 Audit Requirement

- 6.3.1.1 EM&A should be carried out in the form of monthly site inspection to ensure the recommended mitigation measures are properly implemented and findings of the audit should be reported in the EM&A reports.

7. ECOLOGY

7.1 Introduction

7.1.1.1 Potential ecological impacts arising from the construction and operation phases of the Project were assessed in the EIA Report. Mitigation and precautionary measures have been recommended to avoid and minimise the impact arising from the Project. With the implementation of appropriate mitigation and precautionary measures, no unacceptable ecological impact would be anticipated. Nonetheless, EM&A is considered necessary during the construction phase of the Project and the requirements are described in this section. No specific ecological EM&A requirements are recommended for the operational phase.

7.2 Mitigation Measures

7.2.1.1 The mitigation measures recommended in the EIA Report to minimise potential ecological impacts are provided in [Appendix B](#).

7.3 Monitoring Requirements

7.3.1.1 A pre-construction herpetofauna survey should be conducted for the modified watercourse within which construction works are proposed, i.e. the channel adjoining the existing site offices along Cheung Tung Road near Sunny Bay by a qualified ecologist with at least 5 years of relevant experience prior to commencement of the construction works at the modified watercourse. A Protection and Translocation Proposal (PTP) should be prepared by a qualified ecologist with at least 5 years of relevant experience, and submitted to relevant government authorities (e.g. EPD and AFCD) for approval. The PTP should include findings of the pre-construction survey, proposed protection and translocation methodologies (e.g. protection measure, timing of the translocation, implementation programme) and monitoring programme, where appropriate.

7.3.1.2 The monitoring and audit programme for marine water quality, as detailed in [Section 4](#) of this Manual, would ensure the effectiveness of mitigation measures and good site practices for controlling water quality impacts during the construction phase, thereby serving to protect marine ecological resources. No specific marine ecological monitoring for the Project is deemed necessary.

7.4 Audit Requirements

7.4.1.1 Site audits should be undertaken on a weekly basis to ensure the proper implementation and maintenance of recommended mitigation measures during the construction phase of the Project.

8. FISHERIES

8.1 Introduction

8.1.1.1 The potential fisheries impact associated with the Project has been assessed in the EIA Report. No unacceptable fisheries impact would be anticipated during the construction and operation phases of the Project and hence no specific monitoring for fisheries resources is considered necessary.

8.2 Mitigation Measures

8.2.1.1 No specific fisheries mitigation measures would be required during both construction and operational phases. Mitigation measures for water quality control recommended in Section 5 of the EIA Report would also serve to protect fisheries resources from indirect impacts. Details of the recommended mitigation measures are presented in [Appendix B](#).

8.3 Monitoring and Audit Requirements

8.3.1.1 No specific fisheries monitoring and auditing programme for construction and operational phases of the Project is required. Monitoring and audit programme for marine water quality, as detailed in [Section 4](#) of this Manual, would be applicable for the protection of the fisheries resources.

9. CULTURAL HERITAGE

9.1 Introduction

- 9.1.1.1 Potential cultural heritage impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. The EIA Study identified four sites of archaeological interest (SAIs) are located within or in vicinity of the assessment area, namely Yam O SAI, Luk Keng Tsuen SAI, Wan Tuk SAI and Mong Tung Hang SAI. There are no declared monuments, proposed monuments, graded historic sites/buildings/structures and government historic sites identified by the Antiquities and Monuments Office (AMO) within the assessment area and therefore no impact on these cultural heritage resources would be anticipated. No EM&A programme for these cultural heritage resources would be required during the construction or operational phases.
- 9.1.1.2 Two other identified items with no status were located within the assessment area, namely the floating docks of Yam O and the former Yu Fung Public School. Both items situate outside the works area of the Project and would not be directly impacted by the proposed works. However, considering the former Yu Fung Public School is located at approximately 30m from the works area, mitigation measures including protective barriers, documentation, condition survey and monitoring were recommended to protect this school building during the construction phase.
- 9.1.1.3 The marine archaeological investigation established that no marine archaeological resources would be impacted by the Project. No monitoring and audit requirements for the marine archaeology would be required during both the construction and operational phases. Nonetheless, as a precautionary measure, the project proponent and his/her contractor are required to inform AMO immediately when any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance are discovered during the marine works. Additionally, in case of any changes to the proposed extent of marine works, the archaeological potential of the area should be reviewed by a marine archaeologist and AMO should be consulted regarding the need and scope of any further investigation.

9.2 Mitigation Measures

- 9.2.1.1 The mitigation measures on cultural heritage recommended in the EIA Report are detailed in [Appendix B](#).

9.3 Monitoring and Audit Requirements

- 9.3.1.1 Thorough cartographic and photographic record, and other documentation means, for example, 3D scanning or photogrammetry of former Yu Fung Public School should be conducted prior to the construction of the Project to act as the record for future conservation/interpretation. Condition and structural survey should also be carried out for the school prior to the commencement of construction works and after all construction works to inspect its physical condition and structural integrity.
- 9.3.1.2 Monitoring of ground-borne vibration, tilting and ground settlement, is proposed to be employed for former Yu Fung Public School ([Figure 9.1](#)) during the site formation and construction phases. The monitoring should be incorporated with a set of Alert, Alarm and Action (AAA) system as well as vibration-sensitive and dilapidated buildings. A monitoring proposal, including type and frequency of monitoring, distribution of monitoring points and proposed actions to be taken when reaching respective monitoring limits. Prior agreement and consent should be sought from the owner(s), stakeholder(s) and relevant Government department(s) for the installation of monitoring points on the built heritages before commencement of the works.
- 9.3.1.3 No EM&A programme for archaeology would be required during the construction phase. Nonetheless, as a precautionary, AMO should be informed immediately when any antiquities or supposed antiquities under the Antiquities and Monuments Ordinance are discovered during the works. Additionally, in case of any changes to the proposed extent of marine works, the archaeological potential of the area should be reviewed by a marine archaeologist and AMO should be consulted regarding the need and scope of any further investigation.

10. HAZARD TO LIFE

10.1 Introduction

- 10.1.1.1 Potential hazard to life impacts during the construction and operational phases of the Project were assessed.
- 10.1.1.2 According to Section 3.4.12 and Appendix J of the EIA Study Brief, a hazard to life assessment shall be conducted to evaluate the risks associated with (i) storage, transport and use of explosives; (ii) on-site transport, generation, storage and use of chlorine at Siu Ho Wan Water Treatment Works (SHWWTW); (iii) on-site transport, generation, storage and use of biogas at Organic Resource Recovery Centre Phase I (ORRC1); and (iv) transshipment of dangerous goods at Sham Shui Kok Transshipment Dock (SSK Dock).
- 10.1.1.3 Based on the latest design, explosives would not be used during both construction and operational phases of the Project. No explosives related hazard would therefore be anticipated.
- 10.1.1.4 On-site chlorine generation (OSCG) plants have been installed in the SHWWTW to replace the conventional liquid chlorine storage, and the plant has been de-listed from the PHI register. The major chlorine gas related hazard associated with operation of the OSCG plants would be the failure associated with the chlorine gas lines, which worst downwind affected distance was estimated to be 260m in the approved EIA for Proposed Comprehensive Residential and Commercial Development atop Siu Ho Wan Depot (Register No.: AEIAR-213/2017). The Project site is located more than 400m from the OSCG plants in SHWWTW, no risk impact to the Project site would be anticipated due to accidental release of chlorine gas from SHWWTW.
- 10.1.1.5 Hazard assessments were conducted to assess the risks associated with operation of the ORRC1 and SSK Dock during the construction and operational phases of the Project.
- 10.1.1.6 The results showed that both the individual risks and societal risks of the ORRC1, taking into account the population induced by the Project, would be in compliance with the risk criteria stipulated in Annex 4 of the TM-EIAO, risk mitigation measures and EM&A are therefore not required.
- 10.1.1.7 The risk associated with accidental detonation during the explosives off-loading operation at SSK Dock on the Project was assessed. The results showed that the individual risks, taking into account the population induced by the Project, would be in compliance with the risk criteria stipulated in Annex 4 of the EIAO-TM. Although part of the FN curves were found to fall within the ALARP region of the HKRG, the risk is found to be mainly contributed by the existing occupants in the North Lantau Refuse Transfer Station instead of the population induced from the Project. Cost-benefit analysis was conducted and no cost-effective measure was identified. Therefore, no mitigation measure is required.

11. LANDSCAPE & VISUAL IMPACT

11.1 Introduction

11.1.1.1 The EIA Report has recommended landscape and visual mitigation measures to be undertaken during construction and operation phases of the Project. This section defines the audit requirement to confirm the recommended landscape and visual mitigation measures in the EIA Report and as depicted in the Landscape and Visual Mitigation Plan are effectively implemented.

11.2 Mitigation Measures

11.2.1.1 The landscape and visual mitigation measures recommended in the EIA Report should be incorporated in the detailed design of the Project. The recommended mitigation measures during construction and operation phases are presented in [Appendix B](#). The construction phase mitigation measures should be adopted from the commencement of construction and should be in place throughout the entire construction period while the mitigation measures for the operation phase should be adopted during the detailed design and be built as part of the construction works so that they are in place on commissioning of the Project.

11.2.1.2 Any potential conflicts among the proposed mitigation measures, the Project works, and operational requirements should be identified and resolved as early as practicable. Any changes to the mitigation measures should be incorporated in the detailed engineering and landscape design drawings and the Landscape and Visual Mitigation Plan.

11.3 Audit Requirements

11.3.1.1 Site inspections should be undertaken by the ET at least once every two weeks during the construction phase to inspect the construction activities and works areas in order to ensure the recommended mitigation measures are properly implemented.

11.3.1.1 EM&A of the Project shall be carried out during construction phase and 12-month establishment period during operation phase of the landscape mitigation measures by the implementation agency to ensure the proposed the proposed mitigation measures are fully implemented.

11.3.1.2 All mitigation measures proposed in the EIA Report as depicted in the Landscape and Visual Mitigation Plan should be audited by Registered Landscape Architect (RLA), as a member of the Environmental Team, to ensure compliance with the intended aims of the measures during construction and the 12-month establishment period during operation phase.

12. SITE ENVIRONMENTAL AUDIT

12.1 Site Inspection

- 12.1.1.1 Site inspection provides a direct means to trigger and enforce the specified environmental protection and pollution control measures. The site inspection shall be undertaken regularly and routinely to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented for the construction activities of the Project. The site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.
- 12.1.1.2 The ET is responsible for formulation of the environmental site inspection, 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 shall also be made known to the IEC.
- 12.1.1.3 Regular site inspections shall be carried out at least once per week during the construction phase. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It shall also review the environmental situation outside the site area that 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);
 - The contract specifications on environmental protection;
 - The relevant environmental protection and pollution control laws; and
 - Previous site inspection results undertaken by the ET and others.
- 12.1.1.4 The Contractor shall update the ET Leader with all relevant information on the construction contract necessary for him to carry out the site inspections. The 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 timeframe as stipulated in the environmental site inspection, deficiency and remedial action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.
- 12.1.1.5 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 Event and Action Plan for environmental monitoring and audit.

12.2 Compliance with Legal and Contractual Requirements

- 12.2.1.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which the construction activities shall comply.
- 12.2.1.2 In order that the works are in compliance with the contractual requirements, all the works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included. The implementation schedule of mitigation measures is summarized in [Appendix B](#).
- 12.2.1.3 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 the any foreseeable potential

for violating the laws can be prevented.

- 12.2.1.4 The Contractor shall regularly copy relevant documents to the ET Leader so that the checking work can be carried out effectively. The documents shall at least include the updated Work Progress Reports, the updated Works Programme, application for any necessary licence/permits under the relevant environmental protection laws, and all the valid licence/permits received to date. The site diary shall also be available for the ET Leader's inspection upon his request.
- 12.2.1.5 After reviewing the documents, the ET Leader shall advise the ER and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor and the ER accordingly.
- 12.2.1.6 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 by the Contractor in order that the Project's environmental protection and pollution control requirements are fulfilled.

12.3 Environmental Complaints

- 12.3.1.1 Complaints shall be referred to the ET Leader for carrying out complaint investigation procedures during construction phase. The ET Leader shall undertake the following procedures upon receipt of the complaints:
- Log complaint and date of receipt onto the complaint database and inform the IEC immediately;
 - Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to project works;
 - If a complaint is valid and due to project works, identify mitigation measures in consultation with the IEC;
 - If mitigation measures are required, advise the Contractor accordingly;
 - Review the Contractor's response to the identified mitigation measures, and the updated situation;
 - If the complaint is a referral from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;
 - Undertake additional monitoring and audit to verify the complaint if necessary, and review that any valid reason for complaint does not recur;
 - Report the investigation results and the subsequent actions to the complainant (If the source of complain is identified through EPD, the result should be reported within the time frame assigned by EPD); and
 - Record the details of the complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.
- 12.3.1.2 During the complaint investigation works, the Contractor and ER shall cooperate with the ET Leader in providing all necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor shall promptly carry out the mitigation. The ET and IEC shall ensure that the measures have been carried out by the Contractor properly.

13. REPORTING

13.1 Introduction

- 13.1.1.1 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.
- 13.1.1.2 ET Leader shall submit baseline monitoring report, monthly EM&A report and final EM&A review report. In accordance with Annex 21 of the EIAO-TM, a copy of the monthly and final EM&A review reports shall be made available to the Director of Environmental Protection.

13.2 Electronic Reporting of EM&A Information

- 13.2.1.1 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.

13.3 Baseline Monitoring Report

- 13.3.1.1 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.
- 13.3.1.2 The baseline monitoring report shall include, but not be limited to the following:
- 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.

13.4 Monthly EM&A Reports

13.4.1 General

13.4.1.1 The results and finding of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader. Monthly EM&A reports shall be submitted to the ER within 10 working days of the end of each reporting month, the first report should be submitted in the month after construction works commence. Each monthly EM&A report shall be submitted to the parties: the Contractor, the IEC, the ER and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic copies.

13.4.1.2 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.

13.4.2 First Monthly EM&A Report

13.4.2.1 The first monthly EM&A report shall be included at least the following:

- i. executive summary (1-2 pages):
 - breaches of AL 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 with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
 - management structure, and
 - works undertaken during the reporting month.
- iii. environmental status:
 - works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage of fines in the fill materials used, etc.); and
 - drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).
- iv. a brief summary of EM&A requirements including:
 - all monitoring parameters;
 - environmental quality performance limits (AL levels);
 - Event-Action Plans;
 - 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 Final EIA report.
- vi. 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;
 - monitoring parameters;
 - monitoring locations;
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - graphical plots of the monitored parameters;
 - major activities being carried out on site during the period;
 - any other factors which might affect the monitoring results; and
 - QA / QC results and detection limits.
- vii. report on non-compliance, complaints, notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (AL levels);
 - record of all complaints received (written or verbal) including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control 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.
- viii. 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;
 - a forecast of the works programme, impact predictions and monitoring schedule for the next reporting month;
 - 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.

13.4.3 Subsequent Monthly EM&A Reports

13.4.3.1 The subsequent monthly EM&A reports during construction phase shall include the following:

- i. executive summary (1 - 2 pages):
- breaches of AL levels;
 - complaints log;
 - notifications of any summons and successful prosecutions;
 - reporting changes; and
 - future key issues.

Basic project information:

- project organisation and management structure;
 - construction programme; and
 - works undertaken during the reporting month.
- ii. environmental status:
- construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection / mitigation measures for the month;
 - works undertaken during the reporting month with illustrations (e.g. location of works, etc.); and
 - drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring stations.
- iii. implementation status:
- 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.
- iv. monitoring results (in both hard and diskette copies) together with the following information:
- monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - graphical plots of the monitored parameters in the reporting month;
 - major activities being carried out on site during the period;
 - any other factors which might affect the monitoring results; and
 - QA / QC results and detection limits.
- v. report on non-compliance, complaints, and notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (AL levels);
 - record of all complaints received (written or verbal) including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control 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.
- vi. 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;

- a forecast of the works programme, impact predictions and monitoring schedule for the next reporting 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.
- vii. appendix
- Action and Limit levels;
 - graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors that might affect the monitoring results.
 - cumulative statistics on complaints, notifications of summons and successful prosecutions;
 - outstanding issues and deficiencies

13.5 Final EM&A Review Report for Construction Phase

- 13.5.1.1 The construction phase EM&A program shall be terminated upon completion of the construction activities that have the potential to result in a significant environmental impact.
- 13.5.1.2 Prior to the proposed termination, it may be advisable to consult relevant local communities. The proposed termination should only be implemented after the proposal has been endorsed by the IEC and the ER followed by final approval from the Director of Environmental Protection.
- 13.5.1.3 The final EM&A review report shall contain at least the following information:
- 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;
 - 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. A summary of the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the Final EIA report, summarised in the updated implementation status proformas;
 - v. drawings showing the project area, environmental sensitive receivers and the locations of the monitoring 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; and
 - any other factors which might affect the monitoring results.
 - vii. a summary of non-compliance (exceedances) of the environmental quality performance limits (AL levels);
 - viii. a brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;

- ix. a summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;
- x. a summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;
- xi. review monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness (including cost effectiveness);
- 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 breaches, investigation, follow-up actions taken and results;
- xiii. review the practicality and effectiveness of the EIA process and EM&A programme (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
- xiv. a conclusion to state the return of ambient and / or the predicted scenario as per EIA findings.

13.6 EM&A Reports for Operation Phase

- 13.6.1.1 Unless otherwise agreed by EPD, quarterly EM&A reports shall be submitted to record the results and findings of the operational traffic noise monitoring during the first year of the Project operation.
- 13.6.1.2 A final EM&A review report for operation phase shall be submitted after completion of the operational traffic noise monitoring. The final EM&A review report for operation phase should contain at least the following information:
 - 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:
 - environmental mitigation measures for operation stage, as recommended in the project EIA Report;
 - environmental impact hypotheses tested;
 - environmental quality performance limits (Action and Limit levels);
 - all monitoring parameters;
 - Event and Action Plans;
 - iv. A summary of the implementation status of environmental protection and pollution control / mitigation measures for operation stage, as recommended in the project EIA Report and summarised in the updated implementation schedule;
 - v. Drawings showing the project area, environmental sensitive receivers and the locations of the monitoring stations;
 - vi. Graphical plots and the statistical analysis of the trends of monitoring parameters over the course of the project, including:
 - 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. A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
 - viii. A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;

- ix. A description of the actions taken in the event of non-compliance;
- x. A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up actions taken and results;
- xi. A review of the validity of EIA predictions for operation stage and identification of shortcomings in EIA recommendations;
- xii. Comments (for example, a review of the effectiveness and efficiency of the mitigation measures, the performance of the environmental management system, and the overall EM&A programme for operation stage); and
- xiii. Recommendations and conclusions (for example, a review of success of the overall EM&A programme for operational stage to cost-effectively identify deterioration and to initiate prompt effective mitigatory action when necessary).

13.7 Data Keeping

- 13.7.1.1 No site-based documents (such as monitoring field records, laboratory analysis records, site inspection forms, etc.) are required to be included in the monthly EM&A reports. However, any such document shall be well kept by the ET Leader and be ready for inspection upon request. All relevant information shall be clearly and systematically recorded in the document. Monitoring data shall also be recorded in electronic format, and the software copy must be available upon request. Data format shall be agreed with the EPD. All documents and data shall be kept for at least one year following completion of the construction contract.

13.8 Interim Notifications of Environmental Quality Limit Exceedances

- 13.8.1.1 With reference to the Event and Action Plan, when the environmental quality performance limits are exceeded, the ET Leader shall immediately notify the IEC, ER, Contractor and EPD, as appropriate. The notification shall be followed up with advice to IEC and EPD on the results of the investigation, proposed actions and success of the actions taken, with any necessary follow-up proposals. A sample template for the interim notifications is presented in [Appendix D](#).