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MTR Corporation Limited

Consultancy Agreement NEX/1062

Siu Ho Wan Station and Siu Ho Wan Depot Replanning Works

Environmental Monitoring and Audit Manual (Final)

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1.1 Project description

1.1.1 MTR Corporation Limited (MTRCL) is currently conducting a study to formulate a technically feasible development scheme for the Proposed Comprehensive Residential and Commercial Development atop Siu Ho Wan Depot (hereinafter referred to the "SHD Topside Development") to optimize housing supply. To facilitate the construction of the SHD Topside Development, railway related works would be required. The existing Siu Ho Wan Depot (SHD) will undergo replanning works to make room for the phased construction of the SHD Topside Development, while maintenance and supporting services to the existing Tung Chung Line (TCL), Airport Express Line (AEL) and Disneyland Resort Line (DRL) should be maintained without causing disruption to the normal operation. A new Siu Ho Wan Station (SHO) has also been proposed along the TCL tracks to meet transport needs of the SHD Topside Development and enable building of a sustainable community.

1.1.2 The key elements of the Project (**Figure No. NEX1062/S/SHD/ACM/Z10/101** refers) as assessed in this Environmental Impact Assessment (EIA) Report are listed below:

- SHD Replanning Works within the eixisting site boundary;
- Construction of concrete slab, which would also support for construction of the podium decking, the residential towers and facilities above for SHD Topside Development, and property enabling works for the SHD Topside Development;
- A new SHO and the associated trackworks at existing AEL/TCL, as well as western access and local access; and
- Provision of the sewerage network outside existing SHD boundary to cater sewage generated by the proposed SHO and Reprovisioned SHD.

1.2 Purpose of the Manual

1.2.1 The purpose of this Environmental Monitoring and Audit (EM&A) Manual is to guide the set-up of an EM&A programme to check on compliance with the Environmental Impact Assessment (EIA) study recommendations of the Project, to assess the effectiveness of the recommended mitigation measures, and to identify any further need for additional mitigation measures or remedial actions.

1.2.2 This EM&A Manual aims to provide systematic procedures for monitoring, auditing and minimizing environmental impacts associated with the construction and operation activities of the Project. It outlines the monitoring and audit programme for the Project.

1.2.3 Hong Kong environmental regulations have served as environmental standards and guidelines in the preparation of this Manual. In addition, the EM&A Manual has been prepared in accordance with the requirements stipulated in Annex 21 of the Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO).

1.2.4 This Manual contains the following information:

- Responsibilities of the Contractor, the Engineer or Engineer's Representative (ER), the Environmental Team (ET), and the Independent Environmental Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the Project;
- Project organization 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.

1.2.5 This EM&A Manual is a dynamic document that should be reviewed regularly and updated as necessary during the construction and operation of the Project. The Contractor should regularly review the mitigation measures and project implementation schedule in **Appendix B** with respect to the design developments and construction methodology.

1.3 Project Organisation

1.3.1 The roles and responsibilities of the various parties involved in the EM&A process and the organisational structure of the organisations who are responsible for implementing the EM&A programme are outlined below. The proposed project organisations and lines of communication with respect to environmental protection works are shown in **Appendix A**.

Engineer or Engineer's Representative (ER)

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

- Supervise the Contractor's activities and ensure that the requirements in the EM&A Manual are fully complied with;
- Inform the Contractor when action is required to reduce environmental impacts in accordance with the Event and Action Plans;
- Participate in joint site inspections and audits undertaken by the ET; and
- Adhere to the procedures for carrying out exceedance and complaint investigations.

The Contractor

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

- Implement the EIA recommendations and requirements;
- Provide assistance to the ET in carrying out relevant environmental monitoring and auditing;

- Submit proposals on mitigation measures in case of exceedances of Action and Limit levels, in accordance with the Event and Action Plans;
- Implement measures to reduce environmental impacts where Action and Limit levels are exceeded until the events are resolved; and
- Adhere to the procedures for carrying out environmental complaint investigation in accordance with **Section 10** of this Manual.

Environmental Team (ET)

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

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

- Set up all the required environmental monitoring stations;
- Monitor the various environmental parameters as required in the EM&A Manual;
- Carry out site inspections to investigate and audit the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation measures, and anticipate environmental issues for proactive and practicable action before problems arise;
- Analyse the EM&A data, review the success of EM&A programme to confirm the adequacy of mitigation measures implemented and the validity of the EIA predictions, and to identify any adverse environmental impacts arising and report EM&A results to the Contractor, IEC, and the ER;
- Liaise with IEC on all environmental performance matters, and timely submission of all relevant EM&A proforma for IEC's approval;
- Prepare reports on the environmental monitoring data and the site environmental conditions;
- Review the proposals of remedial measure from the Contractor in the case of exceedances of Action and Limit levels, in accordance with the Event and Action Plans;
- Advise the Contractor on environmental improvement, awareness, enhancement matters, etc., on site;
- Submit the EM&A report(s) to the Project Proponent and the EPD timely; and
- Adhere to the procedures for carrying out environmental complaint investigation in accordance with **Section 10** of this Manual.

Independent Environmental Checker (IEC)

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

- Review and audit at not less than monthly intervals in an independent, objective and professional manner in all aspects of the EM&A programme;
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring locations, monitoring procedures and locations of sensitive receivers;

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

1.4 Structure of the EM&A Manual

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

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

2 AIR QUALITY

2.1 Introduction

2.1.1 The major dusty construction activities of the Project would mainly be related to construction dust from excavation, piling, materials handling, spoil removal, backfilling and wind erosion which would generate insignificant amount of small size particulates, hence, no significant Respirable Suspended Particulates (RSP) or Fine Suspended Particulates (FSP) impacts would be anticipated. Monitoring of 24-hour RSP and 24-hour FSP levels are not proposed. Therefore, only 1-hour Total Suspended Particulates (TSP) is recommended to be monitored and audited at the proposed monitoring locations.

2.1.2 No adverse air quality impact is expected during the operation of the Project, and thus air quality monitoring would not be required.

2.1.3 In this section, the requirements, methodology, equipment, monitoring locations and criteria for the monitoring and audit of construction dust impact during the construction phase of the Project are presented.

2.2 Monitoring Parameters and Equipment

2.2.1 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”).

2.2.2 Dust laden with air should be drawn through a high volume sampler (HVS) fitted with a conditioned, pre-weighed filter paper, at a controlled rate. After sampling, the filter paper with retained particles is collected and returned to the laboratory for drying in a desiccator followed by accurate weighing. TSP levels are calculated from the ratio of the mass of particulates retained on the filter paper to the total volume of air sampled.

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

- 0.6 - 1.7 m^3 per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
- equipped with a timing / control device with ± 5 minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm^2 (63 in^2);
- flow control accuracy: ± 2.5% deviation over 24-hour sampling period;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a shelter to protect the filter and sampler;

- 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.

2.2.4 The ET is responsible for the provision of the monitoring equipment and should provide sufficient number of dust monitoring equipments with appropriate calibration kit for carrying out the baseline, regular impacts monitoring and ad-hoc monitoring. The HVSs should be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals, in accordance with requirements stated in the manufacturers operating manual and as described below. All the equipment, calibration kit, filter papers, etc, should be clearly labelled. The instrument should also be calibrated regularly.

2.2.5 Initial calibration of HVSs with mass flow controller should be conducted upon installation and thereafter every six months. The transfer standard shall be traceable to the internationally recognized primary standard and be calibrated annually. The calibration data should be properly documented for future reference by the IEC.

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

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

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

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

2.2.9 If the ET Leader proposes alternative dust monitoring equipment / methodology (e.g. direct reading methods) after the approval of this Manual, agreement from the IEC should be sought. The instrument should also be calibrated regularly following the requirements specified by the equipment manufacturers.

2.3 Laboratory Measurement / Analysis

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 Hong Kong Laboratory Accreditation Scheme (HOKLAS) accredited or other internationally accredited laboratory.

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 IEC. Measurement performed by the laboratory shall be demonstrated to the satisfaction of the ER and the IEC and EPD.

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

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

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 is then returned to the laboratory for reconditioning in the humidity controlled chamber followed by accurate weighing by an electronic balance with a readout down to 0.1 mg. The balance shall be regularly calibrated against a traceable standard.

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

2.4 Dust Monitoring Stations

2.4.1 The worst potentially affected locations in the vicinity of the construction activities of the Project identified for TSP monitoring are listed in **Table 2.1** and are shown in **Figure No. NEX1062/S/SHD/ACM/Z10/271**.

Table 2.1 Proposed Dust Monitoring Stations

Monitoring Station No.	ASR ID in EIA Report	ASR Description	Monitoring Period[1][2]	
			Start	End
DM1	A2	Siu Ho Wan Government Maintenance Depot	Upon commencement of Stage 1 SHD Replanning Works	Upon completion of concrete slab of Stage 4 SHD Replanning Works
DM2	Near A108	Podium level of Phase 1a SHD Topside	Upon population intake at Phase 1a SHD Topside Development and commencement of Stage 2 SHD Replanning Works	Upon completion of concrete slab of Stage 2 SHD Replanning Works
DM3	Near A125	Podium level of Phase 1b SHD Topside	Upon population intake at Phase 1b SHD Topside Development	Upon completion of concrete slab of Stage 2 SHD

Monitoring Station No.	ASR ID in EIA Report	ASR Description	Monitoring Period[1][2]	
			Start	End
			and commencement of Stage 2 SHD Replanning Works	Replanning Works
DM4	Near A118	Podium level of Phase 1a SHD Topside Development	Upon population intake at Phase 1a SHD Topside Development and commencement of Stage 3 SHD Replanning Works	Upon completion of concrete slab of Stage 3 SHD Replanning Works
DM5	Near A146	Podium level of Phase 1a SHD Topside Development	Upon population intake at Phase 1a SHD Topside Development and commencement of Stage 4 SHD Replanning Works	Upon completion of concrete slab of Stage 4 SHD Replanning Works

Note:
(1) Monitoring period is subject to the actual population intake of the ASR and construction programme of SHD Replanning Works. Representative monitoring stations are selected to monitor the dust impact from each stage of SHD Replanning Works.
(2) 1-hour TSP impact monitoring should be conducted at the monitoring stations when there are Project-related major construction activities being undertaken within a radius of 500m from the monitoring stations.

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

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 TM-EIAO
- Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring ; and
- Take into account the prevailing meteorological conditions.

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

- A horizontal platform with appropriate support to secure the samplers against gusty wind should be provided;
- Two samplers should not be placed less than 2m apart;
- the distance between the sampler and an obstacle, such as buildings, must be at least twice the height that the obstacle protrudes above the sampler;
- 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 the samplers;
- airflow around the sampler is unrestricted;
- the sampler is more than 20m from the dripline;
- any wire fence and gate to protect the sampler, should not cause any obstruction during monitoring;
- permission must be obtained to set up the samplers and to obtain access to the monitoring stations; and
- a secured supply of electricity is needed to operate the samplers.

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

2.5 Baseline Monitoring

2.5.1 Baseline monitoring should be carried out to determine the ambient 1-hour TSP levels at the monitoring locations prior to the commencement of the major construction works. Before commencing the baseline monitoring, the ET should inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.

2.5.2 TSP baseline monitoring should be carried out for a continuous period of at least two weeks with three sets of 1-hour ambient measurements taken daily at each monitoring station. During the baseline monitoring, there should not be any dust generating activities in the vicinity of the monitoring stations. General meteorological conditions (wind speed, direction and precipitation) and notes regarding any significant adjacent dust producing sources should also be recorded throughout the baseline monitoring period. A summary of baseline monitoring is presented in **Table 2.2**.

2.5.3 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The alternative baseline monitoring locations shall be agreed with the IEC prior to commencement of baseline monitoring.

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

2.5.5 If the ET Leader considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels and air quality criteria, after consultation and agreement with the ER, the IEC and the EPD.

2.6 Impact Monitoring

2.6.1 The ET shall carry out impact monitoring during major construction activity of the Project being undertaken within a radius of 500m from the monitoring stations. 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. The impact monitoring programme is summarised in **Table 2.2**.

2.6.2 The monthly schedule of the impact monitoring programme should be drawn up by the ET one month prior to the commencement of the scheduled construction period. Before commencement of the monitoring, the ET should inform the IEC of the impact monitoring programme such that the IEC can conduct an on-site audit.

Table 2.2 Summary of Construction Dust Monitoring Programme

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

Notes:
* Impact monitoring should be conducted at the monitoring stations for 1-hour TSP monitoring when there are Project-related major construction activities being undertaken within a radius of 500m from the monitoring stations. Monitoring period at each designated monitoring location is specified in **Table 2.1**.

2.7 Event and Action Plan

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

Table 2.3 Proposed Action and Limit Levels for Impact Monitoring

Parameter	Action Level (1)	Limit Level
1-hour TSP	• For BL ≤ 384μg m^{-3}, AL = (BL * 1.3 + LL)/2 • For BL > 384μg m-3, AL = LL	500μg m^{-3}

Note:
(1) BL = Baseline level, AL = Action level, LL = Limit level.

2.7.2 The Event and Action Plan prescribes procedures and actions associated with the outcome of the comparison of air quality monitoring data recorded and the agreed A/L levels. In the cases where exceedances of these A/L levels occurs, the ET, the IEC, the ER and the Contractor should strictly observe the relevant actions of the respective Event and Action Plan listed in **Table 2.4**.

2.8 Mitigation Measures

2.8.1 Site-specific dust mitigation measures recommended in the EIA Report include watering on active works areas, exposed areas and paved haul roads, enclosing the unloading process at barging point, good site practices and dust suppression measures stipulated in Air Pollution Control (Construction Dust) Regulation. Details of the mitigation measures are presented in **Appendix B**.

Table 2.4 Event and Action Plan for Construction Dust Monitoring

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
ACTION LEVEL				
Exceedance for one sample	1. Repeat measurement to confirm findings; 2. If exceedance is confirmed, inform the Contractor, IEC and ER; 3. Identify source(s), investigate the causes of exceedance and propose remedial measures; and 4. Increase monitoring frequency.	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; and 3. Discuss with ET, ER and Contractor on possible remedial measures 4. Review and advise the ET and ER on the effectiveness of the proposed remedial measures.	1. Confirm receipt of notification of exceedance in writing.	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.
Exceedance for two or more consecutive samples	1. Repeat measurements to confirm findings; 2. If exceedance is confirmed, inform Contractor, IEC and ER; 3. Identify source(s), investigate the causes of exceedance and propose remedial measures; 4. Increase monitoring frequency to daily; 5. Advise the Contractor and ER on the effectiveness of the proposed remedial measures; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with Contractor, IEC and ER to discuss the remedial measures to be taken; and 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; and 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Review and advise the ET and ER on the effectiveness of the proposed remedial measures; and 5. Supervise Implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC agree with the Contractor on the remedial measures to be implemented; and 3. Supervise implementation of remedial measures	1. Identify source(s) and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER, ET and IEC within three working days of notification for agreement; 3. Implement the agreed proposals; and 4. Amend proposal as appropriate.

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
LIMIT LEVEL				
Exceedance for one sample	1. Repeat measurement to confirm findings; 2. If exceedance is confirmed, inform the Contractor, IEC, EPD and ER; 3. Identify source(s), investigate the causes of exceedance and propose remedial; 4. Increase monitoring frequency to daily; and 5. Discuss with the ER, IEC and Contractor on the remedial measures and assess effectiveness.	1. Check monitoring data submitted by the ET; 2. Check Contractor's working method; 3. Discuss with the ET, ER and Contractor on possible remedial measures; 4. Review and advise the ET and ER on the effectiveness of the proposed remedial measures; and 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Review and agree on the remedial measures proposed by the Contractor; and 3. Ensure remedial measures properly implemented.	1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to ER, ET and IEC within three working days of notification for agreement; 4. Implement the agreed proposals; and 5. Amend proposal if appropriate.
Exceedance for two or more consecutive samples	1. Repeat measurement to confirm findings; 2. If exceedance is confirmed, inform IEC, ER, Contractor and EPD; 3. Identify source(s), investigate the causes of exceedance and propose remedial measures; 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	1. Check monitoring data submitted by the ET; 2. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 3. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 4. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER, IEC and ET within three working days of notification for agreement; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; and 6. Stop the relevant

EVENT	ACTION			
	ET	IEC	ER	CONTRACTOR
	keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring.			portion of works as determined by the ER until the exceedance is abated.

3 AIRBORNE NOISE

3.1 Introduction

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

3.2 Construction Noise

Noise Parameters

3.2.1 The construction noise level should be measured in terms of the A-weighted equivalent continuous sound pressure level (L_{eq}). $L_{eq\ (30\ min)}$ should be used as the monitoring parameter for the time period between 0700 and 1900 hours on normal weekdays.

3.2.2 Supplementary information for data auditing and statistical results such as L_{10} and L_{90} should also be obtained for reference. A sample data record sheet is shown in **Appendix C** for reference.

Monitoring Equipment and Methodology

3.2.3 As referred to the requirements of the Technical Memorandum (TM) issued under the NCO, sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications should be used for carrying out the noise monitoring. Immediately prior to and following each noise measurement the accuracy of the sound level meter should be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the difference between calibration levels obtained before and after the noise measurement is less than 1.0 dB.

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

3.2.5 The ET is responsible for the provision of the monitoring equipment and should ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and ad hoc monitoring. All the equipment and associated instrumentation should be clearly labelled.

Noise Monitoring Stations

3.2.6 Based on the findings of EIA Report, the designated locations for construction noise monitoring are listed in **Table 3.1** and are shown in **Figure No. NEX1062/S/SHD/ACM/Z10/272**.

Table 3.1 Noise Monitoring Stations during Construction Phase

Monitoring Station No.	Noise Assessment Point (NAP) in EIA Report	Source of Impact	Monitoring Period(1)	
			Start	End
CN1	101-06	Stage 2 SHD Replanning	Upon population intake at Phase 1a SHD	Until completion of concrete slab of

Monitoring Station No.	Noise Assessment Point (NAP) in EIA Report	Source of Impact	Monitoring Period(1)	
			Start	End
		Works	Topside Development and commencement of Stage 2 Replanning Works construction works at Phase 2	Stage Phase 2 SHD Replanning Works
CN2	118-04	Stage 3 SHD Replanning Works	Upon population intake at Phase 1a SHD Topside Development and commencement of Stage 3 Replanning Works	Until completion of concrete slab of Stage 3 SHD Replanning Works
CN3	149-04	Stage 3 & 4 SHD Replanning Works	Upon population intake at Phase 1c SHD Topside Development and commencement of Stage 3 Replanning Works	Until completion of concrete slab of Stage 3 and 4 SHD Replanning Works(2)

Note:
(1) Monitoring Period subject to the actual population intake of the NSR and construction programme of SHD Replanning Works. Representative NAP is selected to monitor the noise impact from each stage of SHD Replanning Works.
(2) Noise monitoring would not be required after the completion of concrete slab of Stage 3 SHD Replanning Works and before commencement of Stage 4 SHD Replanning Works.

3.2.7 The status and location of noise sensitive receivers (NSRs) may change after approval of this Manual. In such case, and if changes to the monitoring locations are considered necessary, the ET should propose alternative monitoring stations and seek approval from the ER and agreement from the IEC and EPD on the proposal. If alternative monitoring stations are proposed, these stations should be chosen based on the following criteria:

- Monitoring at NSRs close to the major site activities of the Project that are likely to arise noise impacts;
- Monitoring as close as possible to the NSRs as defined in the TM-EIAO; and
- Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring.

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

Baseline Monitoring

3.2.9 The ET should carry out baseline noise monitoring prior to the commencement of the construction works of the Project. The baseline noise levels should be measured for a continuous period of at least 14 consecutive days at a minimum logging interval of 30 minutes for daytime (between 0700 and 1900 hours of normal weekdays) and

15 minutes (as three consecutive $L_{eq, (5\ minutes)}$ readings) for evening time (between 1900 and 2300 hours on normal weekdays), general holidays including Sundays (between 0700 and 2300 hours) and night-time (between 2300 and 0700 on all days). The L_{eq}, L_{10} and L_{90} should be recorded at the specified interval. Before commencing the baseline monitoring, the ET should inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.

3.2.10 There should not be any construction activities in the vicinity of the monitoring stations during the baseline monitoring. Any non-project related construction activities in the vicinity of the monitoring stations during the baseline monitoring should be noted and the source and location of such activities should be recorded.

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

Impact Monitoring

3.2.12 Noise monitoring should be carried out at all the designated monitoring stations when there are Project-related construction activities being undertaken within a radius of 300m from the monitoring stations. The monitoring should 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 within 300m from respective monitoring station are underway.

3.2.13 In the case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in Event and Action Plan in **Table 3.3**, should be carried out. This additional monitoring should be continued until the recorded noise levels show that the non-compliance is rectified or proved to be irrelevant to the Project-related construction activities.

Event and Action Plan

3.2.14 The Action and Limit levels for construction noise are defined in **Table 3.2**. Should non-compliance of the noise quality criteria occur actions in accordance with the Event and Action Plan in **Table 3.3** should be taken.

Table 3.2 Action and Limit Levels for Construction Noise Impact Monitoring

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

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

Table 3.3 Event and Action Plan for Construction Noise Monitoring

EVENT	ACTION			
	ET	**IEC**	**ER**	**CONTRACTOR**
Action Level	1. Investigate the complaint and propose remedial measures; 2. Discuss with the ER and Contractor on the remedial measures required; and 3. Increase monitoring frequency to check mitigation effectiveness.	1. Review the investigation results submitted by the Contractor; and 2. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Notify the Contractor, ET, IEC and Confirm receipt of notification of complaint in writing; 2. Review and agree on the remedial measures proposed by the Contractor; and 3. Supervise implementation of remedial measures.	1. Investigate the complaint and propose remedial measures; 2. Report the results of investigation to the IEC, ET and ER; 3. Submit noise mitigation proposals to the ER, IEC and ET within three working days of notification for agreement; and 4. Implement noise mitigation proposals.
Limit Level	1. Repeat measurement to confirm exceedance; 2. If exceedance is confirmed, notify the Contractor, IEC, EPD and ER; 3. Identify source and investigate the causes of exceedance; 4. Increase monitoring frequency; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with the IEC and ER to discuss the remedial measures to be taken; 7. Review the effectiveness of Contractor's remedial measures and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET; 2. Check the Contractor's working method; 3. Discuss with the ER, ET and Contractor on the potential remedial measures; and 4. Review and advise the ET and ER on the effectiveness of the remedial measures proposed by the Contractor.	1. Confirm receipt of notification of failure in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.	1. Identify source and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER, IEC and ET within three working days of notification for agreement; 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.

3.3 Operation Noise – Fixed Plant

Commissioning Test

3.3.1 Prior to the operation of respective staging of Reprovisioned SHD, noise commissioning tests for planned fixed noise sources should be conducted by independent qualified person(s) possessing at least 7 years of noise control experience and a corporate membership of Hong Kong Institute of Acoustics or equivalent. The noise commissioning test report should be submitted to the ER, ET and IEC for agreement.

3.3.2 The purpose of the commissioning test is to demonstrate that the maximum permissible sound power level (max. SWL) of the planned fixed plant noise sources assumed in the EIA report could be achieved.

3.3.3 It is anticipated that the Project would provide ventilation louvres at the boundary of the Reprovisioned SHD. With reference to existing MTR's depot ventilation system design, the max. SWL of planned louvers have been categorized into groups listed in **Table 3.4**.

Table 3.4 Groups of Ventilation Louvre

Group	Max. SWL during Daytime/ evening, dB(A)	Max. SWL during night-time, dB(A)
A	81-85	71-75
B	86-90	76-80
C	91-95	81-85
D	96-100	86-90
E	101-105	91-95
F	106-110	96-100
G	75-85	75-85

3.3.4 In consideration of similar noise emission in each group, SWL measurement should be conducted for one representative louvre in each group to demonstrate the compliance of max. SWL determined in the EIA Report or otherwise approved by the EPD in compliance with the requirements in the TM-EIAO having due regard to the characteristics of tonality, impulsiveness and intermittency.

3.4 Operation Noise – Railway Noise

Noise Parameter and Criteria

3.4.1 To ensure that the operational airborne railway noise levels comply with the noise standards stipulated in the NCO, the ET should carry out commissioning tests at the potentially worst affected NSRs (i.e. SHD Topside Development) identified in the EIA study before the population intake of respective phasing of SHD Topside Development. The railway noise commissioning tests should be conducted by independent qualified person(s) possessing at least 7 years of noise control experience and a corporate membership of Hong Kong Institute of Acoustics or equivalent. The noise commissioning test report should be submitted to the ER, ET and IEC for agreement.

3.4.2 The Technical Memorandum on Noise from Places other than Domestic Premises, Public Places or Construction Sites (TM-IND) stipulates the appropriate acceptable noise levels (ANL) for airborne railway noise. The ANLs are dependent on area sensitivity rating (ASR) of the noise sensitive receivers and are shown in **Table 3.5**.

Table 3.5 Acceptable Noise Levels for Airborne Railway Noise

Time Period	Noise Criteria ($L_{eq, 30min}$, dB(A))		
	ASR A	ASR B	ASR C
Daytime and Evening (0700 to 2300 hours)	60	65	70
Night-time (2300 to 0700 hours)	50	55	60

Monitoring Equipment and Methodology

3.4.3 The monitoring equipment and methodology for operational noise monitoring should be same as those recommended for construction noise monitoring.

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

3.4.5 One set of 30-minute measurement at the designated monitoring station should be conducted during night-time (2300 – 0700 hours). Noise measurements of the A-weighted equivalent continuous sound pressure level (L_{eq}) should be made. $L_{eq\ (30\ minutes)}$ should be used as the monitoring parameter. Supplementary information for data auditing, statistical results, such as L_{max}, L_{10} and L_{90} should also be obtained for reference.

Noise Monitoring Stations

3.4.6 Based on the findings of EIA Report, the designated locations for railway noise monitoring are listed in **Table 3.6** and are shown in **Figure No. NEX1062/S/SHD/ACM/Z10/274**.

Table 3.6 Noise Monitoring Stations For Railway Noise

Phase	Monitoring Station No. (1)	NAP in EIA Report	ASR(2)	Monitoring Programme(3)
1a	RN1	118-04	C	Before population intake at Phase 1a SHD Topside Development
1b	RN2	123-01	C	Before population intake at Phase 1b SHD Topside Development
1c	RN3	149-03	C	Before population intake at Phase 1c SHD Topside Development
2	RN4	206-01	C	Before population intake at Phase 2 SHD Topside Development
3	RN5	307-05	C	Before population intake at Phase 3 SHD Topside Development
4	RN6	422-06	C	Before population intake at Phase 4 SHD Topside Development

Note:
(1) One set of 30-minute measurement at the designated monitoring station should be conducted during night-time (2300 – 0700 hours). Relevant noise criterion should be adopted for compliance checking accordingly.
(2) The corresponding ASRs of the NSRs are determined based on the best available information and is for indicative assessment only. The Noise Control Authority shall determine noise impact from concerned noise sources on the basis of prevailing legislation and practices being in force, and the ASRs determined in this report should not bind the Authority when enforcing the NCO based on the contemporary conditions. The ASR would be reviewed as necessary based on the contemporary conditions/situations such as adjoining land uses, influencing factors or the latest SHD Topside Development layout.

(3) Monitoring programme subject to the actual population intake of the NSR and operation programme of SHO.

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

- Monitoring at NSRs close to the major operation activities of the Project that are likely to arise noise impacts;
- Monitoring as close as possible to the NSRs as defined in the TM-EIAO; and
- Assurance of minimal disturbance to the occupants and working under a safe condition during monitoring.

3.5 Mitigation Measures

Construction Phase

3.5.1 The EIA Report indicates that construction activities would cause airborne noise exceedances at a few NSRs, and therefore, appropriate noise mitigation measures and good site practices are recommended. The Contractor should be responsible for the design and implementation of these measures. The implementation schedule for the recommended mitigation measures is presented in **Appendix B**.

3.5.2 In the event of exceedances or complaints, the Contractor should review the effectiveness of these mitigation measures and propose, design and implement alternative or additional measures as appropriate. The Contractor should liaise with the ET and ER on alternative or additional remedial measures, if appropriate, and the proposal of the measures should be submitted to the ER and IEC for agreement. The Contractor should implement the agreed remedial measures properly.

Operation Phase

3.5.3 The mitigation measures as recommended in the EIA Report for the fixed plant and railway noise associated with the Project is presented in **Appendix B**. These measures should be reviewed and refined by the ER and ET if there are any major design changes during the detailed design phase such that the recommended measures are adequate for alleviating the potential operation noise impacts.

4 WATER QUALITY

4.1 Introduction

4.1.1 With proper recommended mitigation measures in place, no adverse water quality is expected during the construction and operation phases.

4.1.2 Regular inspections of the construction activities and works areas should be conducted to ensure that the recommended mitigation measures are properly implemented.

4.2 Audit Requirement

Construction Phase

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

4.2.2 Site audit should be carried out by the ET to ensure the water pollution control measures as recommended in **Appendix B** are properly implemented. In the event that the recommended mitigation measures are not properly implemented, the following actions should be conducted:

- Record the problems and investigate the causes;
- Issue action notes to the Contractor who is responsible for the works;
- Implement remedial and corrective actions immediately;
- Re-inspect the site conditions upon completion of the remedial and corrective actions; and
- Record the event and discuss with the Contractor for preventive actions.

4.2.3 Compliance audits are to be undertaken to ensure that a valid discharge license has been issued by EPD prior to the dis charge of effluent from the construction activities of the Project site. If monitoring of the treated effluent quality from the works areas is required during the construction phase of the Project, the monitoring should be carried out in accordance with the Water Pollution Control Ordinance (WPCO) license which is under the ambit of regional office (RO) of EPD. The audit results reflect whether the effluent quality is in compliance with the discharge license requirements. In case of non-compliance, the following actions should be undertaken:

- The Contractor should notify the ET, IEC and ER;
- The Contractor, ET and ER should identify the sources of pollution and recommend and agree the appropriate mitigation measures for the Contractor to implement;
- The ER and ET should check the implementation status of the agreed mitigation measures by the Contractor;
- The Contractor, ET and ER should investigate the operating conditions of the on-site wastewater treatment systems;
- The Contractor should implement corrective and remedial actions to improve the effluent quality;
- The Contractor should increase monitoring frequency until the effluent quality is in compliance with the discharge licence requirements; and

- The ET should record the non-compliance and propose preventive measures.

Operation Phase

4.2.4 No adverse water quality impact would be anticipated during the operation phase, provided that all recommended mitigation measures are properly implemented. Therefore, water quality monitoring and audit is not required during the operation phase.

4.3 Mitigation Measures

4.3.1 Mitigation measures for water quality control have been recommended in the EIA Report. The Contractor should be responsible for the design and implementation of these measures.

4.3.2 Recommended mitigation measures to minimize the adverse impacts on water quality during the construction stage are listed in the implementation schedule given in **Appendix B**.

4.3.3 The requirements of the environmental audit programme are set out in **Section 10** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

4.3.4 In the event of complaints, or non-compliance/area of improvement being observed, the ET and Contractor should review the effectiveness of these mitigation measures, design alternative or additional mitigation measures as appropriate and propose to the IEC for approval and ER for agreement and the Contractor should implement these alternative or additional measures accordingly.

5 SEWERAGE AND SEWAGE TREATMENT IMPLICATIONS

5.1 Introduction

5.1.1 The EIA Report has assessed the implications on sewerage and sewage treatment due to the operation of the Project. This section reviews the EM&A associated with sewerage and sewage treatment implications.

5.2 Mitigation Measures

5.2.1 The mitigation measures related to sewerage and sewage treatment implications as presented in **Appendix B** should be incorporated in the detailed design and be built as part of the construction works so that they are in place before commissioning of the Project.

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

5.3 Audit Requirements

5.3.1 With the implementation of mitigation measures as presented in **Appendix B**, operational phase impact is not anticipated. Hence, monitoring and audit requirements are not required.

6 WASTE MANAGEMENT IMPLICATIONS

6.1 Introduction

6.1.1 Construction and Demolition (C&D) materials, sediment, general refuse from workforce and chemical waste would be generated during the construction phase. It is the Contractor's responsibility to ensure all the waste arisen from the Project are handled, stored and disposed of in accordance with good waste management practices, relevant legislation and waste management guidelines. Provided that these wastes are handled, transported and disposed of using approved methods and that the recommended good site practices and relevant legislation are strictly followed, adverse environmental impacts would not be expected.

6.1.2 As there would be limited quantities of waste to be generated from the operation of the Project, no adverse environmental impacts is anticipated with the implementation of good waste management practices. Monitoring and audit programme for the operation phase of the Project would not be required.

6.2 Audit Requirement

6.2.1 Regular audits and site inspections should be carried out during construction phase by the ER, ET and Contractor to ensure that the recommended good site practices and the recommended mitigation measures 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.

6.2.2 The requirements of the environmental audit programme are set out in **Section 10** of this Manual. The audit programme will verify the implementation status and evaluate the effectiveness of the mitigation measures.

6.3 Mitigation Measures

6.3.1 The mitigation measures recommended in EIA Report should form the basis of the site Waste Management Plan (WMP) to be developed by the Contractor during the construction stage.

6.3.2 It is recommended that the waste generated during the construction activities should be audited regularly by the ET to determine if wastes are being managed in accordance with approved procedures and the site WMP. The audit should look at all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Apart from site inspection, documents including licences, permits, disposal and recycling records should be reviewed and audited for compliance with the legislation and contract requirements. In addition, the routine site inspections should check the implementation of the recommended good site practices and other waste management mitigation measures.

6.3.3 With the appropriate handling, storage and disposal of waste arising from the construction works as recommended in **Appendix B**, adverse environmental impacts would not be expected. During the site inspections, the ET should pay special attention to the issues relating to waste management and check whether the Contractor has implemented the recommended good site practices and mitigation measures.

7 LAND CONTAMINATION

7.1 Introduction

7.1.1 Land contamination assessment has been conducted for the Project. Site appraisals, in the form of desktop review and site walkovers, had been carried out to identify the areas with potential land contamination concern within the tentative works area.

7.1.2 Since the concerned areas are still in operation and undertaking the site investigation (SI) works during the EIA stage is not feasible due to significant impact to the existing SHD operations and the need for maintaining the depot function to support existing operating railway lines, the SI works and any necessary remediation action are recommended to be carried out after decommissioning of concerned facilities but prior to construction works at the concerned areas. The follow-up works as stated below should be conducted after decommissioning works:

- Prior to the commencement of the SI works, a review on the Contamination Assessment Plan (CAP) should be conducted to confirm whether the proposed SI works are still valid to determine the appropriateness of the Risk-Based Remediation Goals (RBRGs) land use scenario for the development.
- Should any changes in operation which lead to any new or the relocation of contamination hotspots or occurrence of spillage or accident be found in the review, supplementary CAP(s), presenting the findings of the review, the latest site conditions and updated sampling strategy and testing protocol, should be submitted to EPD for endorsement. The supplementary CAP(s), Contamination Assessment Report(s) (CAR(s)) and, if necessary, Remediation Action Plans (RAP(s)) should be submitted to EPD for endorsement. Remediation action, if required, will be carried out according to the endorsed RAP(s) and Remediation Report(s) (RR(s)) demonstrating the completion of remediation works at the area(s) (if any) confirmed with contamination will be prepared and submitted to EPD for approval prior to the commencement of construction works at the contaminated areas.

7.1.3 With the implementation of the recommended follow-up works for the concerned areas, any soil / groundwater contamination would be identified and properly treated prior to construction works at the concerned areas. Specific EM&A requirement is therefore not required.

7.2 Mitigation Measures

7.2.1 If land contamination is identified, precautionary measures are recommended in **Appendix B** to minimize environmental impacts arising from handling of potentially contaminated materials. The Contractor should be responsible for the implementation of these measures.

8 LANDSCAPE AND VISUAL

8.1 Introduction

8.1.1 The EIA Report has recommended landscape and visual mitigation measures for the construction and operation phases of the Project. This section defines the audit requirements to confirm the recommended landscape and visual impact mitigation measures are effectively implemented.

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

8.2 Mitigation Measures

8.2.1 The landscape and visual mitigation measures should be incorporated in the detailed design. The mitigation measures during construction and operation phases as recommended in the EIA Report are presented in **Appendix B**. Where feasible, the construction phase mitigation measures should be implemented as early as possible in order to minimize the landscape impacts in the construction stage while the mitigation measures for the operation phase should be adopted during the detailed design and be built as part of the construction works so that they are in place before commissioning of the Project.

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

8.3 Audit Requirements

8.3.1 Site audits should be undertaken during the construction phase of the Project to check that the proposed landscape and visual mitigation measures are properly implemented and maintained as per their intended objectives. Site inspections should be undertaken by the ET at least once every month during the construction period.

9 HAZARD TO LIFE

9.1 Introduction

9.1.1 It is predicted that there would be no adverse hazard to life impact during the construction and operation phases of the Project.

9.2 Mitigation Measures

9.2.1 The recommended mitigation measures as presented in **Appendix B** of this EM&A Manual should be implemented to meet the TM-EIAO requirements.

10 ENVIRONMENTAL AUDITING

10.1 Site Inspection

10.1.1 Site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area by providing a direct mean to trigger and enforce specified environmental protection and pollution control measures. Site inspection should be undertaken regularly during the construction phase to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented for the activities associated with the Project.

10.1.2 The ET Leader should be responsible for formulating the environmental site inspection programme as well as the deficiency and remedial action reporting system, and for carrying out the site inspections. The proposal for rectification, if any, should be prepared and submitted to the ET Leader and IEC by the Contractor.

10.1.3 Regular site inspections should be carried out and led by the ER and attended by the Contractor and ET at least once per week during the construction phase. The areas of inspection should not be limited to the environmental conditions and the pollution control and mitigation measures within the works area, it should also review the environmental conditions of locations that are beyond the boundary of the works area but are likely to be affected directly or indirectly by the construction site activities of the Project. During the inspection, the following information should be referred to:

- The EIA Report and EM&A recommendations on environmental protection and pollution control mitigation measures;
- Ongoing results of the EM&A programme;
- Works progress and programme;
- Individual works methodology proposals (which should include the proposal on associated pollution control measures);
- Contract specifications on environmental protection and pollution prevention control;
- Relevant environmental protection and pollution control legislations; and
- Previous site inspection results undertaken by the ET and others.

10.1.4 The Contractor should keep the ER and ET Leader updated with all relevant environmental related information on the construction contract necessary for him/her to carry out the site inspections. Site inspection results and associated recommendations for improvements to the environmental protection and pollution control efforts should be recorded and followed up by the Contractor in an agreed time-frame. The Contractor should follow the procedures and time-frame stipulated in the environmental site inspection, and the deficiency and remedial action reporting system to be formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.

10.1.5 The ER, ET and the Contractor should also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Event and Action Plan for the EM&A programme.

10.2 Environmental Compliance

10.2.1 There are statuary requirements on environmental protection and pollution control with which construction activities must comply.

10.2.2 To ensure that the works are in compliance with the statutory requirement, all method statements of works should be submitted by the Contractor to the ER for approval and to the ET Leader for vetting to ensure sufficient environmental protection and pollution control measures have been included. The implementation schedule of mitigation measures is summarized in **Appendix B**. Any proposed changes to the mitigation measures in **Appendix B** shall be certified by the ET Leader and verified by the IEC as conforming to the relevant information and recommendations contained in the EIA Report.

10.2.3 The ER and ET Leader should also review the progress and programme of the works to check that relevant environmental legislations have not been violated, and that any foreseeable potential for violating laws can be prevented.

10.2.4 The Contractor should provide the update of the relevant documents to the ET Leader so that works checking could be carried out effectively. The document should at least include the updated Works Progress Reports, updated Works Programme, method statements, any application letters for licences / permits under the environmental protection legislations, and copies of all valid licences / permits. The site diary should also be available for the inspection by the relevant parties.

10.2.5 After reviewing the documentation, the ET should advise the Contractor of any non-compliance with legislative requirements on environmental protection and pollution control so that they can timely take follow-up actions as appropriate. If the follow-up actions may still result in violation of environmental protection and pollution control requirements, the ER and ET should provide further advice to the Contractor to take remedial action to resolve the problem.

10.2.6 Upon receipt of the advice, the Contractor should undertake immediate action to remedy the situation. The ER and ET should follow up to ensure that appropriate action has been taken in order to satisfy legal requirements.

10.3 Choice of Construction Method

10.3.1 At times during the construction phase, the Contractor may submit method statements for various aspects of construction. This state of affairs would only apply to those construction methods that the EIA Report has not imposed conditions while for construction methods that have been assessed in the EIA Report, the Contractor is bound to follow the requirements and recommendations in the EIA Report. The Contractor is required to submit details of methodology and equipment to the ER for approval before commencement of work. The Contractor's options for alternative construction methods may introduce adverse environmental impacts into the Project. It is therefore the responsibility of the Contractor and ET, in accordance with established environmental standards and guidelines, as well as EIA study recommendations and requirements, to review and determine the adequacy of the environmental protection and pollution control measures in the Contractor's proposal in order to ensure no unacceptable impacts would result. To achieve this end, the ET shall provide a copy of the Proactive Environmental Protection Proforma as shown in **Appendix C3** to the IEC for verification before commencement of work. The IEC should verify the review of the construction method and endorse the proposal on the basis of no adverse environmental impacts.

10.3.2 In case the Contractor needs to update the mitigation measures and/or the project implementation schedule as a result of alternative construction method(s) or other condition (e.g. site constraint(s)), the ET shall also review the latest recommendation of mitigation measures and/or project implementation schedule by submission of a Proactive Environmental Protection Proforma as shown in **Appendix C4**. The IEC should verify the Proforma and conduct audit to confirm proper implementation of the

alternative measures.

10.4 Environmental Complaints

10.4.1 The following procedures should be undertaken upon receipt of any environmental complaint:

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

11 REPORTING

11.1 Introduction

11.1.1 Types of reports that the ET should prepare and submit include Baseline Monitoring Report, Monthly EM&A Reports and Final EM&A Review Report. In accordance with Annex 21 of the TM-EIAO, a copy of the monthly and final review EM&A reports should be made available to the Director of Environmental Protection.

11.1.2 Reports can be provided in an electronic medium upon agreeing the format with the ER and EPD. All the monitoring data (baseline and impact) should be submitted in electronic medium.

11.2 Baseline Monitoring Report

11.2.1 The ET should prepare and submit a Baseline Environmental Monitoring Report at least one month before commencement of construction works. Copies of the Baseline Environmental Monitoring Report should be submitted to the IEC, ER and EPD. The ET should liaise with the relevant parties on the exact number of copies require.

11.2.2 The Baseline Monitoring Report should include at least the following information:

(i) up to half a page of executive summary;

(ii) brief description of project background information;

(iii) drawings showing locations of the baseline monitoring stations;

(iv) monitoring results (in both hard and 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
- quality assurance (QA) / quality control (QC) results and detection limits

(v) details of influencing factors, including:

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

(vi) determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data;

(vii) revisions for inclusion in the EM&A Manual; and

(viii) comments and conclusions.

11.3 Monthly EM&A Reports

11.3.1 The results and findings of all EM&A works required in this Manual should be recorded in the monthly EM&A reports prepared by the ET and endorsed by the IEC. The first Monthly EM&A Report should be prepared and submitted to EPD within a month after the major construction works commences with the subsequently Monthly EM&A Reports due in 10 working days of the end of each reporting month. Copies of each monthly EM&A report should be submitted to each of the three parties: ER, IEC and EPD. Before submission of the first monthly EM&A Report, the ET should liaise with the parties on the exact number of copies and format of the monthly reports in both hard copy and electronic copies.

11.3.2 The ET should review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

11.4 First Monthly EM&A Report

11.4.1 The first Monthly EM&A Report should include at least but not limited to the following:

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

(ii) basic project information:
- project organization including key personnel contact names and telephone numbers;
- construction programme;
- management structure; and
- works undertaken during the reporting month.

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

(iv) summary of EM&A requirements:
- all monitoring parameters;
- environmental quality performance limits (Action and Limit levels);
- Event and Action Plans;
- environmental mitigation measures, as recommended in the EIA Report; and
- environmental requirements in contract documents.

(v) implementation status:

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

(vi) monitoring results (in both hard and 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; and
- graphical plots of the monitoring parameters in the reporting month annotated against the following;
  a) major activities being carried out on site during the reporting period;
  b) weather conditions during the reporting period;
  c) any other factors which might affect the monitoring results; and
  d) QA/QC results and detection limits.

(vii) report on non-compliance, complaints, notifications of summons and status of prosecutions:

- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliances, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(viii) others:

- an account of the future key issues as reviewed from the works programme and method statements of works;
- advice on the solid and liquid waste management status;
- record of any project changes from that originally proposed as described in the EIA Report (e.g. construction methods, mitigation proposals, design changes, etc); and
- comments (e.g. the effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

11.5 Subsequent Monthly EM&A Reports

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

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

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

(ii) basic project Information:

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

(iii) environmental status:

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

(iv) implementation status:

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

(v) monitoring results (in both hard and soft copies) together with the following information:

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- monitoring parameters;
- monitoring locations (and depth);
- monitoring date, time, frequency and duration; and
- graphical plots of the monitoring parameters in the reporting month annotated against the following;
  a) major activities being carried out on site during the reporting period;
  b) weather conditions during the reporting period;
  c) any other factors which might affect the monitoring results; and
  d) QA/QC results and detection limits.

(vi) report on non-compliance, complaints, notifications of summons and status of prosecutions:

- record of all non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);
- record of all complaints received, including the locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislation, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
- review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- descriptions of the actions taken in the event of non-compliances and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(vii) others:

- an account of the future key issues as reviewed from the works programme and method statements of works;
- advice on the solid and liquid waste management status;
- record of any project changes from that originally proposed as described in the EIA (e.g. construction methods, mitigation proposals, design changes, etc); and
- comments (e.g. the effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

(viii) appendix:

- Action and Limit levels;
- graphical plots of trends of the monitoring parameters over the past four reporting periods for the representative monitoring stations annotated against the following:
  a) major Project activities being carried out on site during the reporting period;
  b) weather conditions during the reporting period; and
  c) any other factors that might affect the monitoring results.
- monitoring schedule for the present and next reporting period;
- cumulative statistics on notifications of summons and successful prosecutions; and
- outstanding issues and deficiencies.

11.6 Final EM&A Report - Construction Phase

11.6.1 The EM&A program should be terminated upon completion of those construction activities that have the potential to result in a significant environmental impact.

11.6.2 Prior to the proposed termination, the proposed termination should be implemented after the proposal has been endorsed by the IEC, the ER and the Project Proponent

followed by final approval from the Director of Environmental Protection.

11.6.3 The ET Leader should prepare and submit the Final EM&A Report which should contain at least the following information:

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

(ii) drawings showing the Project area, environmental sensitive receivers and locations of the monitoring stations;

(iii) basic project information including a synopsis of the project organisation, contacts of key management, and a synopsis of works undertaken during the course of the Project;

(iv) a brief summary of EM&A requirements including:

- environmental mitigation measures, as recommended in the EIA Report;
- environmental impact hypotheses tested;
- environmental quality performance limits (Action and Limit levels);
- all monitoring parameters; and
- Event and Action Plans;

(v) a summary of the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the EIA Report, summarised in the updated implementation schedule;

(vi) graphical plots and the statistical analysis of the trends of monitoring parameters over the course of the Project, including the post-project monitoring for all monitoring stations annotated against:

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

(vii) a summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit levels);

(viii) a review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate;

(ix) a description of the actions taken in the event of non-compliance;

(x) a summary record of all complaints received , liaison and consultation undertaken, actions and follow-up procedures taken;

(xi) a summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection / pollution control legislation, locations and nature of the breaches, investigation follow-up actions taken and results;

(xii) a review of the validity of EIA predictions and identification of shortcomings of the recommendations proposed in EIA Report; and

(xiii) comments (for example, a review of the effectiveness and efficiency of the mitigation measures and of the performance of the environmental management system, that is, of the overall EM&A programme); and

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

11.7 Data Keeping

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

11.8 Interim Notifications of Environmental Quality Limit Exceedances

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