THE GOVERNMENT OF THE HONG KONG
SPECIAL ADMINISTRATIVE REGION
DRAINAGE SERVICES DEPARTMENT

Tolo Harbour Sewerage of Unsewered Areas, Stage II - Investigation, Design and Construction

Sai O Trunk Sewer Sewage Pumping Station

Environmental Monitoring and Audit Manual

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1. INTRODUCTION

1.1 Background

1.1.1.1 The Environmental Protection Department (EPD) commissioned a study entitled "Tolo Harbour Catchment Study on Unsewered Developments" (SMP) in 1989. The purposes of conducting the study were to establish an inventory of all unsewered areas within the Tolo Harbour Catchment, to identify specific solutions to alleviate the pollution problems caused by these unsewered areas, and to recommend short- and long-term measures to reduce pollution entering the Tolo Harbour.

1.1.1.2 The short-term measures were implemented under the project entitled "Tolo Harbour Catchment – first-aid measures" and comprised the interception and diversion of pollution flows into the existing sewerage system at seven locations in Sha Tin and Tai Po. These measures are completed and in operation. The long-term measures include the provision of sewerage facilities to collect pollution discharges from 165 unsewered areas within the Tolo Harbour Catchment.

1.1.1.3 Since the completion of the SMP, the projected populations in the region have increased significantly. To assess whether the existing sewerage system has the capacity for the future need, EPD completed another study, the Review of North District and Tolo Harbour Sewerage Master Plans (the Review) in November 2002. The Review recommended, amongst others, construction of sewers and pumping stations with associated rising mains for provision of sewerage to the unsewered areas in Sha Tin and Tai Po and also the extension of existing trunk sewer in Ma On Shan along Sai Sha Road with construction of a pumping station at the downstream of this trunk main. Based on the findings and recommendations of the Review, the scope of works under Stage II has been repackaged. To tackle the local pollution issues at Shing Mun River and the proposed Lung Mei Artificial Beach, the proposed village sewerage works under Stage I Phase IIC and Stage II have also been re-prioritised.

1.1.1.4 A Preliminary Environmental Review (PER), undertaken for the proposed sewerage works under "Tolo Harbour Sewerage of Unsewered Areas, Stage II – Investigation, Design and Construction", identified the proposed Sai O Trunk Sewer sewage pumping station (SPS) located at the north of Sai O near Nai Chung, as a Designated Project (DP) under the Environmental Impact Assessment Ordinance (EIAO) that requires an environmental permit for its construction and operation.

1.1.1.5 In accordance with the requirements of Section 5(1)(a) of the EIAO, an application for an Environmental Impact Assessment (EIA) Study Brief for the proposed sewage pumping station was submitted on 30 October 2014 under EIAO with a Project Profile (PP) (No. PP-517/2014). An EIA Study Brief No.ESB-281/2014 for "Sai O Trunk Sewer Sewage Pumping Station" (hereafter referred to as "the Project") was issued on 10 December 2014.

1.2 Project Description

1.2.1.1 The proposed Sai O Trunk Sewer SPS, as part of Public Works Programme Item 4125DS - Tolo Harbour Sewerage of Unsewered Areas, Stage II, is a core component of the proposed trunk sewerage system in Ma On Shan along Sai Sha Road. It is required to receive all sewage flows along Sai Sha Road from Kei Ling Ha Lo Wai to Cheung Muk Tau and the adjacent residential development, health care institution and education institutions, and then convey the sewage to Sha Tin Sewage

Treatment Works. Based on the latest design, the installed capacity per day of the proposed Sai O Trunk Sewer SPS is about 20,600m^3 for coping with the sewerage needs of both existing and future developments. Location of the proposed Sai O Trunk Sewer SPS is shown in **Figure 1.1**.

1.2.1.2 The proposed Sai O Trunk Sewer SPS include the following main components:

- Loading/unloading bay
- Inlet chamber
- Coarse screen channel
- Distribution chamber
- Wet wells
- Valve chamber
- Emergency storage tank
- Deodorizing unit
- Switch room
- Transformer room

1.3 Construction Programme

1.3.1.1 The construction of the Project is planned to commence in year 2021 for completion, commissioning and operation in year 2024. A tentative construction programme is provided in **Appendix A**.

1.4 Purpose of the 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 Organisation

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 by the project proponent prior to the commencement of the construction of the project to implement the EM&A programme in accordance with the EM&A requirements as contained in the EM&A Manual to ensure the compliance with the project's environmental performance requirements. The ET shall be an independent party from the Contractor and the IEC and have relevant professional qualifications or have sufficient relevant EM&A experience subject to approval of the ER. The ET shall be led and managed by the ET leader. The ET leader shall possess at least 7 years of experience in EM&A and/or environmental management.

1.5.1.5 The ET leader shall be responsible for certifying the environmental acceptability of permanent and temporary works, relevant plans and submissions required in the EM&A manual and/or under the EP. The ET Leader shall keep a contemporaneous log-book for recording each and every instance or circumstance or change of circumstances that may affect the compliance with the recommendations of the EIA Report. The log-book shall be kept readily available for inspection by all persons assisting in supervision of the implementation of the recommendations of the EIA Report and the EP or by the Director of Environmental Protection (DEP) or his authorised officers.

1.5.1.6 The broad 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 11.3** of this EM&A Manual.

Independent Environmental Checker (IEC)

1.5.1.7 The IEC shall be employed by the project proponent prior to the commencement of the construction pf 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.

1.5.1.8 The IEC shall be responsible for the duties defined in this Manual, and shall audit the overall EM&A programme, including the implementation of all environmental mitigation measures, submissions required in this Manual, as well as any other relevant submissions required under the EP. The IEC shall be responsible for verifying the environmental acceptability of permanent and temporary works, relevant design plans and submissions under the EP. The IEC shall verify the log-book prepared and kept by the ET Leader. The IEC shall notify EPD by fax, within 24 hours of receipt of notification from the ET Leader of any such instance or circumstance or change of circumstances or non-compliance with the EIA Report or the EP, which might affect the monitoring or control of adverse environmental impact.

1.5.1.9 The board 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..

1.5.1.10 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 assessed in the EIA Report.

2.1.1.2 No adverse air quality impact from construction of the Project would be anticipated with the implementation of dust suppression measures as stipulated under *Air Pollution Control (Construction Dust) Regulation* (Cap 311R) and *EPD's Recommended Pollution Control Clauses for Construction Contracts*. Nonetheless, dust monitoring is recommended during the construction phase to ascertain that there would be no adverse dust impacts at the nearby sensitive receivers. Regular weekly site environmental audit is also recommended to ensure the implementation of recommended mitigation measures during construction phase.

2.1.1.3 With effective implementation of the proposed odour control measures, no adverse odour impact would be expected during the operation of the proposed SPS. Nonetheless, it is recommended to conduct odour monitoring at the proposed deodorizing unit prior to and upon the operation of the SPS to ascertain the effectiveness of the deodorisation system. In addition, odour patrol is also recommended to be carried out during the period of regular (generally once to twice every year) and any *ad hoc* maintenance or cleaning of the deodorization system to ensure no adverse odour impacts arisen from the operation of the Project.

2.1.1.4 This section presents the requirements, methodology, equipment, monitoring locations, criteria and protocols for the monitoring and audit of air quality impact during the construction and operational phases of the Project.

2.2 Construction Phase

Monitoring Parameters

2.2.1.1 The major dusty construction activities of the Project would mainly be related to fugitive dust generated wind erosion of the excavated areas and stockpiles, as well as from construction activities including site clearance, excavation and lateral support (ELS), bulk excavation, backfilling, pipework and roadworks. Therefore, 1-hour Total Suspended Particulates (TSP) is recommended to be monitored and audited at the proposed monitoring locations during construction phase.

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

2.2.1.3 Monitoring and audit of the TSP levels shall be carried out by the ET to ensure that any deteriorating air quality could be readily detected and timely action shall be undertaken to rectify such situation.

2.2.1.4 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 EPD and IEC, an alternative sampling method of using direct reading methods which are capable of producing comparable results as that by the high-volume sampling method can be used to indicate short event impacts

2.2.1.5 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**.

Monitoring Equipment

2.2.1.6 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: ± 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.

2.2.1.7 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 direct reading dust meters is proposed to be used, the ET Leader should submit sufficient information to the IEC to prove that the instrument is capable of achieving a comparable result as that of the HVS may be used for the 1-hour sampling. The instrument should also be calibrated regularly.

2.2.1.8 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.

2.2.1.9 The flow rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded on the data sheet as shown

in **Appendix C**.

2.2.1.10 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.

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

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

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

Laboratory Measurement / Analysis

2.2.1.13 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.

2.2.1.14 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.

2.2.1.15 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.

2.2.1.16 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.

2.2.1.17 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.

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

Monitoring Location

2.2.1.19 The selected monitoring location is the worst potentially affected air sensitive receivers located in the vicinity of construction sites. The proposed air quality monitoring location during construction phase is listed in **Table 2.1** below and shown in **Figure 2.1**.

Table 2.1 Proposed Construction Dust Monitoring Station

Monitoring Station ID	EIA ASR ID	Location
CA_M1	A1	In front of Hong Kong Baptist Theological Seminary (HKBTS) Staff & Students Quarters

2.2.1.20 The status and locations of the air quality sensitive receivers may change after issuing this Manual. In such case, the ET shall propose updated monitoring locations and seek approval from ER and IEC and agreement from EPD on the proposal. Alternative monitoring location shall be approved by EPD prior to the change.

2.2.1.21 When alternative monitoring locations are proposed, the following criteria, as far as practicable, shall be followed:

i. at the site boundary or such locations close to the major dust emission source;
ii. close to the air sensitive receivers as defined in the EIAO-TM;
iii. proper position/sitting and orientation of the monitoring equipment; and
iv. take into account the prevailing meteorological conditions.

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

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

Baseline Monitoring

2.2.1.23 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.

2.2.1.24 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.

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

2.2.1.26 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. Alternative monitoring location shall be approved by EPD prior to the change.

2.2.1.27 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.

2.2.1.28 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 revised baseline levels, in turn, the air quality criteria, shall be agreed with the IEC and EPD.

Impact Monitoring

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

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

audit to ensure accuracy of the impact monitoring results.

Table 2.2 Summary of Construction Dust Monitoring Programme

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

Event and Action Plan

2.2.1.31 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. **Table 2.3** shows the air quality criteria, namely Action and Limit levels to be used. Should non-compliance of the air quality criteria occur, action in accordance with the Action Plan in **Table 2.4** shall be carried out.

Table 2.3 Action and Limit Levels for Air Quality (Construction Dust)

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

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

Table 2.4 Event and Action Plan for Air Quality (Construction Dust)

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

2.3 Operational Phase

2.3.1 Odour Monitoring for Deodorising Unit

Prior to SPS Operation

2.3.1.1 Prior to operation of the proposed SPS, a commissioning test for the deodorising unit should be conducted to ensure the deodorising unit meet the removal efficiency (i.e. at least 99.5% H_2S removal efficiency) as stated in the EIA Report. Measurements of H_2S concentration at the inlet and outlet of the deodorising unit shall be conducted by portable H_2S analyser, type Jerome 631-X H_2S, or equivalent which utilises a gold film sensor for the detection of hydrogen sulphide. The instrument should be controlled by microprocessor, ensuring rapid accurate analyses, and should be fitted with the following accessories:

- Data logger (to allow the instrument to operate unattended);
- Interface cable and interface software; and
- Data download and graphics services.

2.3.1.2 All the equipment and associated instrumentation shall be clearly labelled. The instrument should be capable of measuring H_2S concentration in the range of at least 3ppb to 25ppm, to an accuracy of ±6%. Verification of the H_2S analyser shall be conducted prior to each set of measurement, with a known concentration of gaseous H_2S. The verification data shall be properly documented for future inspection by the concerned parties such as the IEC. The H_2S analyser shall also be checked, calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme before use and subsequently re-calibrated every year throughout the commissioning test. A valid calibration certification details the name of laboratory, type of equipment used and calibration result shall be provided.

2.3.1.3 The H_2S removal efficiency should be calculated from the measured H_2S concentrations. In case the removal efficiency (i.e. at least 99.5% H_2S removal efficiency) is not met, immediate action should be taken to rectify the problem and necessary works to be carried out to ensure and prove that the deodorising unit achieves the required removal efficiency prior to operation of the proposed SPS. When rectification work is complete, the deodorising unit shall be retested to verify the required performance can be achieved. Commissioning test requirements should be agreed with EPD at least 1 month prior to the commissioning test.

Upon SPS Operation

2.3.1.4 Upon operation of the SPS, odour emission rate at the exhaust of the deodorising unit shall be monitored to compare with the exhaust odour emission rate presented in Appendix 3.2 of the EIA Report (i.e. should not exceed / maximum value of 272.5 OU/s). The monitoring shall be conducted in the first two years. Details of the monitoring requirement are presented below.

2.3.1.5 During odour sampling, odour gas sample of sufficient volume should be collected at the deodorising unit exhaust to a container (such as sample bag) for temporary storage. To avoid any potential contamination, the equipment and sample bag should be made of odourless material, which should not absorb or react with odourous samples, be sufficiently impervious to prevent any significant loss of odour components, be reasonably robust, be leak-free. The sample bags should be manufactured from PTFE, Tedlar if the bags to be reused or from nalophane NATM

if the sample bags are to be discarded after use. The sample should not be exposed to direct sunlight to minimise any potential chemical reaction within the sample bag. The sample should be delivered to odour laboratory within the same day.

2.3.1.6 During odour sampling, the deodorising unit exhaust emission parameters should be recorded, including its location, diameter, exhaust flowrate, exit velocity and temperature, etc. Meteorological conditions, including ambient air temperature, relative humidity, wind direction and wind speed, should be recorded from the nearest Hong Kong Observatory's weather station during the sample period. Any odour detected during sampling should be recorded with the duration of the odour during sampling and flavours of the odour with detailed description of characteristics (e.g. sewage or rotten-egg smell, decayed vegetables, ammoniacal, dischargeable odour, putrefaction, sharp, pungent, fish, irritating, fruit, vinegar, etc.). Environmental conditions such as abnormal observation, namely any odour generating activities observed in the vicinity of the monitoring should be recorded. Photos of the sampling activities and nearby environment should be taken as record.

2.3.1.7 Olfactometry analysis must be conducted for the odour sample in accordance with European Standard Method: Air Quality – Determination of Odour Concentration by Dynamic Olfactometry (EN13725) and be completed within 24 hours of the odour sampling time. The olfactometry analysis should be conducted by at least 5 certified odour panel members, who meet the following minimum requirements:

- Participate in a set of screening tests using a certified n-butanol gas with their individual thresholds (n-butanol) complied with the requirement of European Standard Method (EN13725) in the range of 20 to 80 ppb with a R value of <2.3 within 2 weeks before commencement of the odour sampling;
- Be at least 18 years of age and have experience in olfactometry analysis for at least two odour sampling projects;
- Be free from any respiratory illnesses and do not normally work near the Project;
- Not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 minutes before and during olfactometry analysis;
- Take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodorants, body lotions or cosmetics;
- Not communicate with each other about the results of their choices; and
- Calibrated their noses within 2 weeks before the olfactometry analysis.

2.3.1.8 Odour emission rate of the deodorizing unit exhaust should be calculated from the measured odour concentration and the recorded emission parameters. The odour emission rate should be compared with that presented in Appendix 3.2 of the EIA Report (i.e. should not exceed / maximum value of 272.5 OU/s). In case the maximum value of exhaust odour emission rate is exceeded, immediate action should be taken to rectify the problem and necessary works to be carried out to ensure and prove that the deodorising unit complies with the exhaust odour emission rate specified in the EIA Report. When rectification work is complete, the exhaust odour emission rate of deodorising unit shall be retested to verify the required performance can be achieved.

2.3.1.9 The first odour monitoring shall be conducted within one month, after the operation of the SPS. Subsequent odour monitoring shall be conducted quarterly, i.e. at the 4th, 7th and 10th month for the first year. For the second year, the frequency of the monitoring could be reduced to once every 6 months subject to EPD's approval, if no

non-compliance is found. If there is any non-compliance (i.e. exhaust odour emission rate exceeds 272.5 OU/s), the operator should rectify the problem and necessary works to be carried out to ensure and prove that the deodorising unit complies with the exhaust odour emission rate specified in the EIA Report. When rectification work is complete, the exhaust odour emission rate of deodorising unit shall be retested to verify the required performance can be achieved. The frequency of odour monitoring shall also be resumed to quarterly. Upon the second-year monitoring, the odour monitoring should be reviewed and agreed with EPD if the monitoring is required to be continued.

2.3.2 Odour Patrol

2.3.2.1 Odour patrol is recommended during the period of regular (generally once to twice every year) and any *ad hoc* maintenance or cleaning of the deodorization system when the deodourising system might not be in its normal operation. The odour patrols will be conducted by an odour patrol team. The odour patrol team will patrol and sniff along an odour patrol route within the SPS site boundary. The implementation of the odour patrols shall be subject to the prevailing weather forecast condition and should not be carried out during rainy days.

2.3.2.2 The odour patrol team shall be comprised of at least two independent trained personnel / competent persons, who should pass a set of screening tests and fulfil the following requirements:

- Have their individual odour threshold of n-butanol in nitrogen gas in the range of 20 to 80 ppb/v required by the European Standard Method (EN 13725);
- Be at least 16 years of age and willing and able to follow instructions;
- Be free from any respiratory illnesses;
- Be engaged for a sufficient period to build up and monitor/detect at several monitoring location;
- Not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 minutes before and during odour patrol;
- Take great care not to cause any interference with their own perception or that of others by lack of personal hygiene or the use of perfumes, deodorants, body lotions or cosmetics; and
- Not communicate with each other about the results of their choices.

2.3.2.3 The independent trained personnel / competent persons should use their noses (olfactory sensors) to sniff odours at the monitoring locations. The main odour emission sources and the areas to be affected by the odour nuisance shall be identified.

2.3.2.4 The perceived odour intensity is divided into 5 levels. **Table 2.5** describes the odour intensity for different levels.

Table 2.5 Odour Intensity Levels

Level	Odour Intensity
0	Not detected. No odour perceived or an odour so weak that it cannot be easily characterised or described
1	Slight identifiable odour, and slight chance to have odour nuisance
2	Moderate identifiable odour, and moderate chance to have odour nuisance
3	Strong identifiable, likely to have odour nuisance
4	Extreme severe odour, and unacceptable odour level

2.3.2.5 The independent trained personnel / competent persons shall record the findings including date and time, weather condition (e.g. sunny, fine, cloudy, and rainy), odour intensity, odour nature and possible odour sources, local wind speed, and wind direction at each location.

2.3.3 Event and Action Plan

2.3.3.1 **Table 2.6** shows the air quality criteria, namely Action and Limit levels to be used for the odour patrol. Should the action or limit level be reached, action in accordance with the Action Plan in **Table 2.7** shall be carried out.

Table 2.6 Action and Limit Levels for Air Quality (Odour)

Parameter	Action Level	Limit Level
Odour Nuisance	Odour intensity of 2 is measured from odour patrol	Odour intensity of 3 or above is measured from odour patrol

Table 2.7 Event and Action Plan for Air Quality (Odour)

EVENT	ACTION	
	Person-in-charge of Odour Patrol	**Operator**
ACTION LEVEL		
Action level from Odour Patrol is reached	1. Identify source / reason of exceedance; 2. Repeat odour patrol to confirm finding	1. Carry out investigation to identify the source/reason of exceedance; 2. Rectify any unacceptable practice; 3. Implement further mitigation measures if necessary.
LIMIT LEVEL		
Limit level from Odour Patrol is reached	1. Identify source / reason of non-compliance; 2. Repeat odour patrol to confirm findings; 3. Assess effectiveness of remedial action and keep EPD informed of the results	1. Carry out investigation to identify the source/reason of non-compliance; 2. Rectify any unacceptable practice; 3. Amended working methods if required; 4. Formulate remedial actions; 5. Ensure amended working methods and remedial actions properly implemented; 6. If non-compliance continues, consider what portion of the work is responsible and stop that portion of the work until the non-compliance is abated; and 7. Correspond to the complainant within 10 days to inform the cause of the nuisance and action taken.

2.4 Mitigation Measures

2.4.1.1 Mitigation measures for construction phase and operational phase air quality impacts have been recommended in the EIA Report. All the recommended mitigation measures are detailed in the implementation schedule as presented in **Appendix B**. The Contractor should be responsible for the design and implementation of the mitigation measures.

2.5 Audit Requirements

2.5.1.1 Weekly site inspection and audit should be conducted during the construction phase of the Project to ensure the recommended mitigation measures in **Appendix B** are properly implemented.

3. NOISE

3.1 Introduction

3.1.1.1 Potential construction noise impact and operational phase fixed plant noise impact arising from the construction and operational phases of the Project were assessed in the EIA Report. Noise monitoring and audit programme is proposed to be undertaken during construction phase.

3.1.1.2 For fixed plant noise impact, a noise commissioning test should be conducted by the Contractor to check and ensure the compliance of the fixed plant noise impact with the relevant noise standards. No noise monitoring during operational phase is required.

3.1.1.3 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 Monitoring Parameters for Construction Noise

3.2.1.1 For the time period between 0700 and 1900 hours on normal weekdays, the construction noise levels should be measured in terms of the 30-minute A-weighted equivalent continuous sound pressure level ($L_{eq\ (30\text{-}min)}$). For all other time periods, $L_{eq\ (5min)}$ shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.

3.2.1.2 Supplementary information for data auditing and statistical results such as L_{10} and L_{90} should also be obtained for reference. A sample noise field data sheet is 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 Monitoring Equipment

3.3.1.1 In accordance to the Technical Memorandum (TM) issued under the NCO, sound level meters (SLM) 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 SLM 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 agrees to within 1.0 dB.

3.3.1.2 Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.

3.3.1.3 The ET is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and *ad hoc* monitoring. All the equipment and associated instrumentation shall be clearly labelled. The equipment installation location shall be proposed by the ET Leader and agreed with the IEC and EPD.

3.4 Monitoring Locations

3.4.1.1 Two noise monitoring points in front of the most affected noise sensitive receivers during construction phase has been proposed and shown in **Figure 3.1**. Details of the proposed noise monitoring points are summarized in **Table 3.1**.

Table 3.1 Proposed Noise Monitoring Stations during Construction of the Project

Noise Monitoring Point	Location
CN_M1	In front of the HKBTS Staff & Students Quarters
CN_M2	In front of the HKBTS Administration and Education Block

3.4.1.2 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. Alternative monitoring location shall be approved by EPD prior to the change.

3.4.1.3 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

3.4.1.4 The construction noise monitoring station shall normally be at a point 1 m from the exterior of the sensitive receivers building façade but may be at another point considered to be appropriate by the Authority. Where a measurement is to be made of noise being received at a place other than a building, the assessment point shall be at a position 1.2 m above the ground, at a particular point considered appropriate by the Authority. 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.

3.5 Baseline Monitoring

3.5.1.1 Baseline noise monitoring shall be carried out daily in all the identified monitoring stations for at least 14 consecutive days prior to the commissioning of the construction works. A schedule of the baseline monitoring shall be submitted to the IEC for approval before the monitoring starts.

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

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

3.6 Impact Monitoring

3.6.1.1 Construction noise monitoring should be carried out at the designated monitoring station when there are Project-related construction activities being undertaken within a radius of 300 m from the monitoring stations. The monitoring frequency should depend on the scale of the construction activities. An initial guide on the monitoring is to obtain one set of 30-minute measurement at each station between 0700 and 1900 hours on normal weekdays

at a frequency of once a week when construction activities are underway.

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

3.6.1.3 In case of non-compliance with the construction noise criteria, more frequent monitoring, as specified in the Action Plan in **Table 3.3** shall be carried out. This additional monitoring shall be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

3.7 Event and Action Plan

3.7.1.1 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) for residential premises;
		70 dB(A) for schools and 65 dB(A) during school examination periods

Notes:

- If works are to be carried out during restricted hours and/or percussive piling is be carried out, the monitoring requirements and the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.

Table 3.3 Event and Action Plan for Construction Noise

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Action Level	1. Notify IEC and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; and 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the analyzed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; and 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify Contractor; 3. Require Contractor to propose remedial measures for the analyzed noise problem; and 4. Ensure remedial measures are properly implemented.	1. Submit noise mitigation proposals to IEC, ET and ER; and 2. Implement noise mitigation proposals.

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

3.8 Mitigation Measures

3.8.1 Construction Phase

3.8.1.1 To alleviate the construction noise impacts on the affected NSRs, adoption of good site practices, use of quiet PME, movable noise barriers/acoustic mats and proper scheduling of noisy construction activities are recommended during construction phase. The implementation schedule for the recommended mitigation measures is presented in **Appendix B**.

3.8.1.2 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 on alternative or additional remedial measures, if appropriate, and the proposal of the measures should be submitted to the ER and IEC for approval. The Contractor should implement the agreed remedial measures properly.

3.8.2 Operational Phase

3.8.2.1 All the fixed plants, with exception for the exhaust fan of the deodorizing unit, would be located confined inside the structure of the proposed Sai O Trunk Sewer SPS with 200mm thick reinforced concrete structure and soundproof door. Silencers or other acoustic treatment equipment should be provided at the outlet of the ventilation fans and exhaust fan of the deodorizing unit in order to ensure compliance of the operation airborne noise levels with the noise standard stipulated in the EIAO-TM and Noise Control Ordinance (NCO). The implementation of the recommended mitigation measures for the fixed plant noise arising from the operation of the Project is presented in **Appendix B**.

3.9 Audit Requirements

3.9.1.1 Weekly site audit during the construction phase of the Project should be conducted to ensure proper implementation of mitigation measures and good site practices listed in **Appendix B**.

3.10 Commissioning Test for Fixed Plant Noise Sources

3.10.1.1 Commissioning test for fixed noise sources should be conducted prior to operation of the SPS to ensure fixed plant noise impact would comply with the relevant noise standards. Commissioning test requirements should be agreed with EPD at least 1 month prior to the commissioning test.

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.

4.1.1.2 Minor water quality impacts would be associated with land-based construction. No unacceptable water quality impact would be expected during the construction phase of the Project with the proper implementation of the recommended mitigation measures and good site practices.

4.1.1.3 Emergency discharge from the proposed Sai O Trunk Sewer SPS due to pumps/parts failure and interruption of the electrical power supply would be the key water quality concern during the operational phase. With incorporation of the precautionary design of the SPS and proper implementation of the proposed mitigation measures, no unacceptable water quality impact would be expected during the operational phase of the Project.

4.2 Mitigation Measures

Construction Phase

4.2.1.1 Mitigation measures specified in ProPECC PN 1/94 "*Construction Site Drainage*" and relevant measures in ETWB TC (Works) No. 5/2005 "*Protection of natural streams / rivers from adverse impacts arising from construction works"* are recommended for the construction phase of the Project. Practices to minimize site surface runoff and the chance of erosion, to retain and reduce any suspended solids prior to discharge, as well as measures to control spillage or waterbody contamination from general construction activities, and sewage effluent as detailed in **Appendix B** should also be implemented.

Operational Phase

4.2.1.2 Measures to avoid the chance of and minimise the impacts from emergency sewage discharge as well as Best Management Practices (BMPs) to reduce pollution of surface runoff from the operation of the SPS are detailed in **Appendix B**.

4.3 Audit Requirements

4.3.1.1 Weekly site audit should be conducted to ensure that the recommended mitigation measures for water quality impacts in **Appendix B** are fully implemented during construction phase of the Project.

5. WASTE MANAGEMENT IMPLICATION

5.1 Introduction

5.1.1.1 Potential waste management implication arising from the construction and operational phases of the Project were addressed in the EIA Report.

5.1.1.2 The Contractor would be responsible for the implementation of any mitigation measures recommended in the EIA report to minimise waste or resolve the issues associated with the management of wastes. Regular inspection should be conducted to ensure proper management and handling of waste, and appropriate implementation of the mitigation measures. A Waste Management Plan (WMP), as a part of the Environmental Management Plan (EMP), should be prepared by the Contractor in accordance with *ETWB TC (W) No.19/2005* and submitted to the Engineer for approval. The auditing requirement stated in *ETWB TC (W) No.19/2005* should be followed with regard to the management of C&D materials.

5.1.1.3 As there would be limited quantities of wastes to be generated from the operation of the Project, no adverse environmental impacts are anticipated with the implementation of good waste management practices. EM&A would not be necessary during the operational phase.

5.2 Mitigation Measures

5.2.1.1 With the proper handling, storage and disposal of wastes arising from the construction of the Project, it is anticipated that the potential adverse environmental impacts would be avoided or minimised. During site inspections, the ER and ET should pay special attention to the issues relating to the waste management and check whether the Contractor has implemented the recommended good site practices and other mitigation measures as listed in **Appendix B**. The recommended mitigation measures should form the basis of the WMP to be prepared by the Contractor in accordance with the *ETWB TC(W) No. 19/2005* prior to the commencement of construction work would provide an overall framework of Waste Management and Reduction.

5.3 Audit Requirements

5.3.1.1 Weekly site audit and site inspection should be carried out during construction phase by the ER, ET and Contractor to ensure that the recommended good site practices and other mitigation measure as detailed in **Appendix B** are properly implemented by the Contractor. The audits should concern all aspects of on-site waste management practices, including the waste generation, storage, recycling, transportation and disposal. Apart from site inspection, documents including licenses, permits, disposal and recycling records should be reviewed and audited for the compliance with the legislation and contract requirements.

5.3.1.2 The requirements of the environmental audit programme are set out in **Section 11** of this EM&A Manual. The audit programme should verify the implementation status and evaluate the effectiveness of the mitigation measures.

6. LAND CONTAMINATION

6.1 Introduction

6.1.1.1 A site appraisal, including site walkover and desktop review, was conducted to identify the potentially contaminating land uses that may pose adverse impact to the Project. The findings were reported in the EIA Report.

6.1.1.2 Based on the findings of the site appraisal, no current or historical potentially contaminating land uses / activities were identified within the Project site and therefore, no land contamination impact associated with the Project is anticipated. No EM&A is therefore required.

7. ECOLOGY

7.1 Introduction

7.1.1.1 Potential ecological impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. With the implementation of good site practice and appropriate control / mitigation measures for construction disturbance (e.g. dust, noise) and water quality impacts, no unacceptable ecological impact would be anticipated during the construction and operation phases of the Project. Since the ecological impact is anticipated to be low and adverse residual ecological impact is anticipated to be nil, no EM&A requirement is required.

7.2 Mitigation Measures

7.2.1.1 Mitigation measures for ecological impacts have been recommend in the EIA Report to minimize potential direct and indirect impacts. The implementation schedule of the mitigation measures is given in **Appendix B**.

8. HAZARD TO LIFE

8.1 Introduction

8.1.1.1 Potential hazard to life impacts arising from the construction and operational phases of the Project were assessed.

8.1.1.2 It was found that the individual risk and societal risk of the two high pressure pipelines and the Sai O Offtake and Pigging Station are of ‘acceptable’ for both construction stage and operation stage. A review on the hazard to life impact from the MOSWTW has concluded that MOSWTW’s risks to the Project is insignificant. No EM&A is required.

9. LANDSCAPE & VISUAL IMPACT

9.1 Introduction

9.1.1.1 Potential landscape and visual impacts arising from the construction and operational phases of the Project were assessed and landscape and visual mitigation measures were recommended in the EIA Report. This section defines the audit requirements to confirm the recommended landscape and visual impact mitigation measures in the EIA Report are effectively implemented.

9.2 Baseline Review

9.2.1.1 A baseline review shall be undertaken at the commencement of the construction contracts. The purpose of the review is:

- to check the status of the Landscape Resources and Character Areas within the construction works sites and works areas and the Visually Sensitive Receivers (VSRs) within the visual envelope;
- to determine whether any change has occurred to the status of the Landscape Resources, Character Areas and VSRs since the EIA;
- to determine whether such change warrants a change in the design of the landscape and visual mitigation measures; and
- to recommend any necessary changes to the recommended landscape and visual mitigation measures in the EIA.

9.3 Mitigation Measures

9.3.1.1 The landscape and visual mitigation measures proposed in the EIA Report are listed in **Table 9.1** and **9.2**. The implementation schedule of the measures is given in **Appendix B**.

Table 9.1 Landscape and Visual Impacts Mitigation Measures for Construction Phase

ID No.	Landscape and Visual Mitigation Measures	Funding Agency	Implementation Agency
CM1	**Preservation of Trees** Trees to be retained in accordance with DEVB TCW No. 4/2020 - Tree Preservation.	Project Proponent	Project Proponent via Contractor
CM2	**Compensatory Tree Planting** Any Trees to be felled under the Project shall be compensated in accordance with DEVB TCW No. 4/2020 - Tree Preservation.	Project Proponent	Project Proponent via Contractor
CM3	**Control of Night-time Lighting Glare** Any lighting provision of the construction works at night shall be carefully controlled to prevent light overspill to the nearby VSRs and into the sky in accordance with “Charter of External Lighting” and “Guidelines on Industry Best Practices for External Lighting Installations” promulgated by ENB.	Project Proponent	Project Proponent via Contractor
CM4	**Erection of Decorative Screen Hoarding** Decorative Hoarding, which is compatible with the surrounding settings, shall be erected during construction to minimise the potential landscape and visual impacts due to the construction works and activities.	Project Proponent	Project Proponent via Contractor

ID No.	Landscape and Visual Mitigation Measures	Funding Agency	Implementation Agency
CM5	**Management of Construction Activities and Facilities** The facilities and activities at works sites and areas, which include site office, temporary storage areas, temporary works etc., shall be carefully managed and controlled on the height, deposition and arrangement to minimise any potential adverse landscape and visual impacts.	Project Proponent	Project Proponent via Contractor
CM6	**Reinstatement of Temporarily Disturbed Landscape Areas** All hard and soft landscape areas disturbed temporarily during construction due to temporary excavations, temporary works sites and works areas shall be reinstated to equal or better quality, to the satisfaction of the relevant government departments.	Project Proponent	Project Proponent via Contractor

Table 9.2 Landscape and Visual Impacts Mitigation Measures for Operational Phase

ID No.	Landscape and Visual Mitigation Measures	Funding Agency	Implementation Agency	Maintenance/ Management Agency
OM1	**Tree and Shrub Planting to soften the proposed SPS** Tree and shrub planting shall be proposed to soften the proposed SPS and enhance the landscape and visual amenity of the Project.	Project Proponent	Project Proponent	Project Proponent
OM2	**Aesthetically pleasing design of the SPS** The design of the proposed SPS in the regard of layouts, forms, materials and finishes shall be sensitively designed so as to blend in the structures to the adjacent landscape and visual context.	Project Proponent	Project Proponent	Project Proponent
OM3	**Provision of Green Roof** Green Roof shall be proposed to enhance the landscape quality of the proposed SPS and mitigate any potential adverse visual impact on adjacent VSRs.	Project Proponent	Project Proponent	Project Proponent
OM4	**Provision of Vertical Greening** Self-climbing species shall be proposed at metal fence wall to soften the proposed SPS and enhance the landscape and visual amenity of the Project.	Project Proponent	Project Proponent	Project Proponent

* Remarks: The arrangement of maintenance / management agencies is subject to agreement with corresponding departments / parties in accordance with DEVB TCW No. 6 / 2015.

9.4 Audit Requirements

9.4.1.1 Site audits should be undertaken during the construction phase of the Project to check that the proposed landscape and visual mitigation measures in **Appendix B** are properly implemented and maintained as per their intended objectives. Site inspections should be

undertaken by the ET at least once every two weeks during the construction period. Inspection findings shall be logged in a site monitoring report with any discrepancies or concerns regarding the implementation and effectiveness of mitigation measures highlighted.

10. CULTURAL HERITAGE

10.1 Introduction

10.1.1.1 Potential cultural heritage impacts arising from the construction and operational phases of the Project were assessed in the EIA Report.

10.1.1.2 No archaeological potential or built heritage resources were identified within 300m from the site boundary of the Project. No cultural heritage impact is anticipated from the construction or operation of the Project. No EM&A is required.

11. SITE ENVIRONMENTAL AUDIT

11.1 Site Inspection

11.1.1.1 Site inspection provide a direct means to trigger and enforce the specified environmental protection and pollution control measures. 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 associated with the Project. The site inspection is one of the most effective tools to enforce the environmental protection requirements at the works area.

11.1.1.2 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 would be made known to the IEC.

11.1.1.3 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.

11.1.1.4 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.

11.1.1.5 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.

11.2 Compliance with Legal and Contractual Requirements

11.2.1.1 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.

11.2.1.2 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.

11.2.1.3 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.

11.2.1.4 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.

11.2.1.5 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.

11.2.1.6 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.

11.3 Environmental Complaints

11.3.1.1 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 complaint, investigation, the subsequent actions and the results in the monthly EM&A reports.

11.3.1.2 During operation phase, same as other existing unmanned sewage pumping stations in Hong Kong (e.g. Ma On Shan and Ma On Shan 108 SPSs in Ma On Shan / Wu Kai Sha areas), the operation of the proposed SPS would be monitored by Sha Tin Sewage Treatment Works (Sha Tin STW) and communication channels for public enquiries / contact on the operation of the unmanned SPS would be displayed at a conspicuous place outside the SPS. Complaints shall be referred to the operator for carrying out complaint investigation procedures.

12. REPORTING

12.1 Introduction

12.1.1.1 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.

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

12.2 Electronic Reporting of EM&A Information

12.2.1.1 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.

12.3 Baseline Monitoring Report

12.3.1.1 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.

12.3.1.2 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.

12.4 Monthly EM&A Reports

12.4.1 General

12.4.1.1 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.

12.4.1.2 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.

12.4.2 First Monthly EM&A Report

12.4.2.1 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.

12.4.3 Subsequent monthly EM&A Reports

12.4.3.1 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

12.5 Final Summary EM&A Report for Construction Phase

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

12.5.1.2 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, the Engineer and the Project proponent followed by final approval from the Director of Environmental Protection.

12.5.1.3 The Final Summary EM&A 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.

12.6 EM&A Reports for Operation Phase

12.6.1.1 Unless otherwise agreed by EPD, quarterly EM&A reports shall be submitted to record the results and findings of the odour monitoring during the first two years of the SPS operation.

12.6.1.2 A final EM&A review report for operation phase shall be submitted after completion of operation 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).

12.7 Data Keeping

12.7.1.1 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.

12.8 Interim Notifications of Environmental Quality Limit Exceedances

12.8.1.1 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**.