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1 INTRODUCTION

1.1 Background

- 1.1.1.1 In the Policy Address 2015, the Government set out the intention to adopt the concept of revitalising water bodies in large-scale drainage improvement works and planning drainage networks for the new development areas. The concept of revitalising water bodies is aimed at promoting greening, biodiversity, beautification and water friendliness in addition to achieving efficient drainage, with a view to building sustainable drainage facilities and providing a better living environment.
- 1.1.1.2 Fo Tan Nullah (FTN) and Tai Wai Nullah (TWN) were identified as one of the waterbodies of high revitalisation potential and therefore were recommended for detailed investigation and proposing revitalisation schemes for implementation, taken into account its unique features and constraints in the feasibility study on “Study on Revitalisation of Water Bodies” (“the Study”) under Agreement No. CE 28/2015 (DS) commissioned by Drainage Services Department (DSD) in December 2015.
- 1.1.1.3 In April 2020, AECOM Asia Company Limited was commissioned by DSD to undertake Agreement No. CE54/2019 (DS) – “Revitalisation of Tai Wai Nullah and Fo Tan Nullah – Investigation” (hereafter referred to as “the Assignment”) to revitalise the existing TWN and FTN with an aim to enhance their ecological value, provide a greener environment, promote water friendliness and improve the community environment. The Assignment also includes provision of dry weather flow interceptors to improve the water quality. As part of the Assignment, an Environmental Impact Assessment (EIA) study under the Environmental Impact Assessment Ordinance (EIAO) is required for the proposed works to TWN and FTN, respectively.
- 1.1.1.4 This EIA Report covers the EIA study for Revitalisation of FTN (hereafter referred to as “the Project”).
- 1.1.1.5 The proposed revitalisation of FTN is classified as designated project (DP) by virtue of Item I.1(b)(ii), Part I, Schedule 2 of the EIAO – “a drainage channel or river training and diversion works which discharges or discharge into an area which is less than 300 m from the nearest boundary of an existing or planned site of cultural heritage”.
- 1.1.1.6 Project Profile for Revitalisation of FTN (No. PP-585/2019) was submitted to the Environmental Protection Department (EPD) on 31 July 2019 for application for an EIA study brief under section 5(1)(a) of the EIAO. The EIA Study Brief for the Revitalisation of FTN (No. ESB-319/2019) was issued on 11 September 2019 under the EIAO.

1.2 Project Scope and Location

- 1.2.1.1 Location plan of the Project is shown in [Figure 1.1](#). The Project comprises the following key components:
- beautification of the existing nullah (approximately 1.7 km long and 10 m to 35 m wide) by re-surfacing, greening and modification of channel bed;
 - provision of Dry Weather Flow Intercepting (DWFI) system;
 - provision of features for ecological enhancement and installation of underground water storage tank [10m (W) x 30m (L) x 2.5m (D)] under the existing Kwai Tei Street Garden equipped with two submersible water pumps installed under the nullah bed at mid-stream of FTN and underground water pipes (housed within the DWFI system) for associated water retention and supplement;
 - construction of viewing decks and revamp of existing footbridges/bridges;
 - revamp/provision of footpaths, railings, amenity areas and pavilions along the nullah banks;
 - improvement/modification of existing planters; and
 - associated works including landscaping, utility works, etc.
- 1.2.1.2 The scope of the abovementioned key components involves the following construction works elements:
- Channel Bed Modification
 - Improvement of Existing Walkways

- Construction of Dry Weather Flow Interceptor System
 - Landscaping and Miscellaneous
 - Desilting at Downstream Tidal Zone
 - Construction of Underground Water Storage Tank and Mid-stream Submersible Water Pumps for Ecological Enhancement Associated Water Retention and Supplement
- 1.2.1.3 During the operational phase, similar to the existing practices, regular maintenance works for the drainage and sewerage systems along FTN would be carried out by the DSD to remove excessive silts, debris and any obstructions to safeguard the hydraulic capacity of the nullah. The maintenance practices and frequency would be similar to the existing maintenance works undertaken by the DSD.
- 1.2.1.4 Environmental Monitoring and Audit (EM&A) programme for air quality, noise, water quality, waste management implications, ecological (terrestrial and marine), and landscape and visual impacts have been recommended during the construction phase to ensure that the recommended mitigation measures in the EIA report are properly implemented. Commissioning tests for fixed noise sources, i.e. the proposed water pumps, have been recommended prior to operation of the Project to ensure the fixed plant noise impact would comply with the relevant noise standards. No EM&A programme is required during the operational phase.

1.3 Construction Programme

- 1.3.1.1 The construction works are tentatively scheduled to commence in Q1 2024 for completion in Q4 2029. 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 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 Technical Memorandum on Environmental Impact Assessment Process (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 12.3** 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 of the Project. The IEC shall be an independent party from the Contractor and the ET. The IEC shall possess at least 7 years of experience in EM&A and/or environmental management.
- 1.5.1.8 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 The potential air quality impacts arising from the construction of the Project would be related to fugitive dust emissions from construction works and gaseous emissions from the use of PME, and odour nuisance from the desilting and excavation works in the nullah. In view of the small scale of the Project, the air quality impacts would be localised and minor, and would be well controlled through the implementation of good site practices and dust suppression measures stipulated in the *Air Pollution Control (Construction Dust) Regulation* as well as the proposed mitigated measures to minimise the exhaust emissions from NRMMS and odour nuisance. No adverse air quality impact due to the construction of the Project would therefore be anticipated. Nonetheless, dust monitoring is recommended during the construction of the underground stormwater storage tank at Kwai Tei Street Playground 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 No adverse air quality impact due to the operation of the Project would be anticipated. With the implementation of DWFI system under the Project to intercept and divert the polluted discharges from drainage outlets along the nullah to the existing sewerage system for treatment, the existing odour nuisance of FTN would be improved as a result of the operation of the Project. No EM&A programme is required during the operational phase.
- 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 phase of the Project.

2.2 Mitigation Measures

- 2.2.1.1 Mitigation measures for construction 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.

2.3 Construction Phase Monitoring

2.3.1 Monitoring Parameters

- 2.3.1.1 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 and pipework. Therefore, 1-hour Total Suspended Particulates (TSP) is recommended to be monitored and audited at the proposed monitoring locations during construction phase.
- 2.3.1.2 The criteria against which ambient air quality monitoring to be assessed are 1-hour TSP limit of 500 $\mu\text{g m}^{-3}$. This level is not to be exceeded at ASRs.
- 2.3.1.3 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.
- 2.3.1.4 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

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

2.3.2 Monitoring Equipment

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

- 0.6 - 1.7 m³ per minute (20 - 60 standard cubic feet per minute) adjustable flow range;
- equipped with a timing / control device with ± 5 minutes accuracy for 24 hours operation;
- installed with elapsed-time meter with ± 2 minutes accuracy for 24 hours operation;
- capable of providing a minimum exposed area of 406 cm²;
- flow control accuracy: $\pm 2.5\%$ deviation over 24-hour sampling period;
- equipped with a shelter to protect the filter and sampler;
- incorporated with an electronic mass flow rate controller or other equivalent devices;
- equipped with a flow recorder for continuous monitoring;
- provided with a peaked roof inlet;
- incorporated with a manometer;
- able to hold and seal the filter paper to the sampler housing at horizontal position;
- easy to change the filter; and
- capable of operating continuously for 24-hour period.

2.3.2.2 The ET shall be responsible for the provision of the monitoring equipment. He shall ensure that sufficient number of HVSs with appropriate calibration kit is available for carrying out the baseline, regular impacts monitoring and ad-hoc monitoring. The HVSs shall be equipped with an electronic mass flow controller and be calibrated against a traceable standard at regular intervals, in accordance with requirements stated in the manufacturers operating manual. All the equipment, calibration kit, filter papers, etc., shall be clearly labelled. If 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.

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

2.3.2.4 The flow rate of the sampler before and after the sampling exercise with the filter in position shall be verified to be constant and be recorded on the data sheet as shown in [Appendix C](#).

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

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

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

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

2.3.3 Laboratory Measurement / Analysis

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

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

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

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

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

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

2.3.4 Monitoring Location

2.3.4.1 The selected monitoring location is the worst potentially affected air sensitive receivers located in the vicinity of construction of the underground water storage tank at Kwai Tei Street Playground. The proposed air quality monitoring location during construction of underground water storage tank at Kwai Tei Street Playground 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_1	A3	Chun Yeung Estate

2.3.4.2 The status and location of the air quality sensitive receiver may change after issuance of this Manual and during the course of construction. In such case, the ET shall propose updated monitoring location and seek agreement from ER and IEC and approval from EPD on the proposal. Alternative monitoring location shall be approved by EPD prior to the change.

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

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

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

- i. a horizontal platform with appropriate support to secure the samplers against gusty wind shall be provided;
- ii. two samplers shall be placed less than 2 meters apart;

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

2.3.5 Baseline Monitoring

- 2.3.5.1 Baseline monitoring shall be carried out to determine the ambient 1-hour TSP levels at the monitoring locations prior to the commencement of the Project. During the baseline monitoring, there shall not be any construction or dust generating activities in the vicinity of the monitoring stations. The baseline monitoring will provide data for the determination of the appropriate Action levels with the Limit levels set against statutory or otherwise agreed limits.
- 2.3.5.2 Before commencing the baseline monitoring, the ET shall inform the IEC of the baseline monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the baseline monitoring results.
- 2.3.5.3 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 requirement is presented in [Table 2.2](#).
- 2.3.5.4 In case the baseline monitoring cannot be carried out at the designated monitoring locations during the baseline monitoring period, the ET Leader shall carry out the monitoring at alternative locations which can effectively represent the baseline conditions at the impact monitoring locations. The ET shall propose updated baseline monitoring location and seek agreement from ER and IEC and approval from EPD on the proposal. Alternative monitoring location shall be approved by EPD prior to the change.
- 2.3.5.5 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with the IEC and EPD to agree on an appropriate set of data to be used as a baseline reference and submit to ER for approval.
- 2.3.5.6 If the ET Leader considers that significant changes in the ambient conditions have arisen, a repeat of the baseline monitoring may be carried out to update the baseline levels. The revised baseline levels, in turn, the air quality criteria, shall be agreed with the IEC and EPD.

2.3.6 Impact Monitoring

- 2.3.6.1 The ET shall carry out impact monitoring during construction phase of the Project. For 1-hour TSP monitoring, the sampling frequency of at least three times in every six-days should be undertaken when the highest dust impact occurs. In case of non-compliance with the air criteria, more frequent monitoring, as specified in the Action Plan in the following section, should be conducted. This additional monitoring should be continued until the excessive dust emission or the deterioration in the air quality is rectified. The impact monitoring programme is summarised in [Table 2.2](#).
- 2.3.6.2 The monthly schedule of the compliance and impact monitoring programme should be drawn up by the ET one month prior to the commencement of the scheduled construction period. Before commencing the impact monitoring, the ET shall inform the IEC of the impact

monitoring programme such that the IEC can conduct on-site audit to ensure accuracy of the impact monitoring results.

Table 2.2 Summary of Construction Dust Monitoring Programme

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

2.3.7 Event and Action Plan

2.3.7.1 The baseline monitoring results form the basis for determining the air quality criteria for the impact monitoring. The ET shall compare the impact monitoring results with air quality criteria set up for 1-hour TSP. [Table 2.3](#) shows the air quality criteria, namely Action and Limit levels to be used. 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 µg ^m - ³ , AL = (BL * 1.3 + LL)/2 BL > 384 µg ^m - ³ , AL = LL	500 µg ^m - ³

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

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

Event	Action			
	ET	IEC	ER	Contractor
Action level being exceeded by one sampling	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of complaint and propose remedial measures; 2. Inform Contractor, IEC and ER; 3. Repeat measurement to confirm finding; and 4. Increase monitoring frequency to daily. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; and 3. Review and advise the ET and ER on the effectiveness of the proposed remedial measures. 	<ol style="list-style-type: none"> 1. Notify Contractor. 	<ol style="list-style-type: none"> 1. Identify source(s), investigate the causes of exceedance and propose remedial measures; 2. Implement remedial measures; and 3. Amend working methods agreed with the ER as appropriate.
Action level being exceeded by two or more consecutive sampling	<ol style="list-style-type: none"> 1. Identify source; 2. Inform Contractor, IEC and ER; 3. Advise the Contractor and ER on the effectiveness of the proposed remedial measures; 4. Repeat measurements to confirm findings; 5. Increase monitoring frequency to daily; 6. Discuss with IEC and Contractor on remedial actions required; 7. If exceedance continues, arrange meeting with Contractor, IEC and ER; and 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET, ER and Contractor on possible remedial measures; 4. Advise the ET and ER on the effectiveness of the proposed remedial measures; and 5. Supervise Implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Identify source and investigate the causes of exceedance; 2. Submit proposals for remedial measures to the ER with a copy to ET and IEC within three working days of notification; 3. Implement the agreed proposals; and 4. Amend proposal as appropriate.
Limit level being exceeded by one sampling	<ol style="list-style-type: none"> 1. Identify source, investigate the causes of exceedance and propose remedial measures; 2. Inform Contractor, IEC, ER, and EPD; 3. Repeat measurement to confirm 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. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by ET; 2. Check Contractor's working method; 3. Discuss with ET and Contractor on possible remedial measures; 4. Advise the ER on the effectiveness of the proposed remedial measures; and 5. Supervise implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. Notify Contractor; 3. Ensure remedial measures properly implemented. 	<ol style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to ER with a copy to ET and IEC within three working days of notification; 4. Implement the agreed proposals; and 5. Amend proposal if appropriate.
Limit level being exceeded by two or more consecutive sampling	<ol style="list-style-type: none"> 1. Notify IEC, ER, Contractor and EPD; 2. Identify source; 3. Repeat measurement to confirm findings; 4. Increase monitoring frequency to daily; 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 6. Arrange meeting with IEC and ER to discuss the remedial actions to be taken; 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET; 2. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 3. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 4. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of exceedance in writing; 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented; 3. Supervise the implementation of remedial measures; and 4. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 1. Identify source(s) and investigate the causes of exceedance; 2. Take immediate action to avoid further exceedance; 3. Submit proposals for remedial measures to the ER with a copy to the IEC and ET within three working days of notification; 4. Implement the agreed proposals; 5. Revise and resubmit proposals if problem still not under control; and 6. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

2.4 Audit Requirements

- 2.4.1.1 Weekly site 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 arising from the construction phase 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 During operational phase, fixed plant noise from the operation of the proposed submersible water pumps installed under the nullah bed at mid-stream of FTN for ecological enhancement associated water supplement would be the major source of noise impacts based on the current design. No adverse noise impact would be anticipated during operational phase of the Project based on the plant inventory provided by the Project Engineer at the time of the assessment. No operational noise monitoring is therefore deemed necessary. Commissioning test should be conducted prior to operation of the Project to ensure fixed plant noise impact would comply with the relevant noise standards.
- 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 Mitigation Measures

- 3.2.1.1 To alleviate the construction noise impacts on the affected NSRs, adoption of good site practices, use of quality PME / quieter construction method, movable noise barriers 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](#).
- 3.2.1.2 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.

3.3 Construction Phase Monitoring

3.3.1 Monitoring Parameters for Construction Noise

- 3.3.1.1 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 ($L_{eq(30-min)}$). For all other time periods, $L_{eq(5min)}$ shall be employed for comparison with the Noise Control Ordinance (NCO) criteria.
- 3.3.1.2 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.

3.3.2 Monitoring Equipment

- 3.3.2.1 In accordance with 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.
- 3.3.2.2 Noise measurements should be made in accordance with standard acoustical principles and practices in relation to weather conditions.
- 3.3.2.3 The ET is responsible for the provision of the monitoring equipment. He shall ensure that sufficient noise measuring equipment and associated instrumentation are available for carrying out the baseline monitoring, regular impact monitoring and *ad hoc* monitoring. All the equipment and associated instrumentation shall be clearly labelled. The equipment installation location shall be proposed by the ET Leader and agreed with the IEC and EPD.

3.3.3 Monitoring Locations

- 3.3.3.1 Three 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 summarised in Table 3.1.

Table 3.1 Proposed Noise Monitoring Stations during Construction of the Project

Noise Monitoring Point	Location
CN_1	Chun Yat House, Chun Yeung Estate
CN_2	57 Fo Tan Village
CN_3	Jockey Club TI-I College

- 3.3.3.2 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 agreement from the IEC and approval from EPD of the proposal. Alternative monitoring location shall be approved by EPD prior to the change.
- 3.3.3.3 When alternative monitoring locations are proposed, the monitoring locations shall be chosen based on the following criteria:
- i. at locations close to the major site activities which are likely to have noise impacts;
 - ii. close to the NSRs; and
 - iii. for monitoring locations located in the vicinity of the sensitive receivers, care shall be taken to cause minimal disturbance to the occupants during monitoring
- 3.3.3.4 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.

3.3.4 Baseline Monitoring

- 3.3.4.1 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.
- 3.3.4.2 During the baseline monitoring, there shall not be any construction activities in the vicinity of the monitoring stations.
- 3.3.4.3 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET Leader shall liaise with EPD and in consultation with the IEC to agree on an appropriate set of data to be used as a baseline reference.

3.3.5 Impact Monitoring

- 3.3.5.1 Construction noise monitoring should be carried out at the designated monitoring station when there are Project-related construction activities being undertaken within a radius of 300 m from the monitoring stations. The monitoring frequency should depend on the scale of the construction activities. An initial guide on the monitoring is to obtain one set of 30-minute measurement at each station between 0700 and 1900 hours on normal weekdays at a frequency of once a week when construction activities are underway.
- 3.3.5.2 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.

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

3.3.6 Event and Action Plan

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

Table 3.2 Action and Limit Levels for Construction Noise

Time Period	Action Level	Limit Level
0700 – 1900 hours on normal weekdays	When one documented complaint is received	75 dB(A) 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 to be carried out, the monitoring requirements and the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.

Table 3.3 Event and Action Plan for Construction Noise

Event	Action			
	ET	IEC	ER	Contractor
Action Level	<ol style="list-style-type: none"> 1. Notify IEC and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; and 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the analysed results submitted by the ET; 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly; and 3. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 4. Confirm receipt of notification of failure in writing; 5. Notify Contractor; 6. Require Contractor to propose remedial measures for the analysed noise problem; and 7. Ensure remedial measures are properly implemented. 	<ol style="list-style-type: none"> 8. Submit noise mitigation proposals to IEC, ET and ER; and 9. Implement noise mitigation proposals.
Limit Level	<ol style="list-style-type: none"> 10. Identify source; 11. Inform IEC, ER, EPD and Contractor; 12. Repeat measurements to confirm findings; 13. Increase monitoring frequency; 14. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented; 15. Inform IEC, ER and EPD the causes and actions taken for the exceedances; 16. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results; and 17. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 18. Discuss amongst ER, ET, and Contractor on the potential remedial actions; 19. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly; and 20. Supervise the implementation of remedial measures. 	<ol style="list-style-type: none"> 21. Confirm receipt of notification of failure in writing; 22. Notify Contractor; 23. Require Contractor to propose remedial measures for the analysed noise problem; 24. Ensure remedial measures properly implemented; and 25. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated. 	<ol style="list-style-type: none"> 26. Take immediate action to avoid further exceedance; 27. Submit proposals for remedial actions to IEC within 3 working days of notification; 28. Implement the agreed proposals; 29. Resubmit proposals if problem still not under control; and 30. Stop the relevant portion of works as determined by the ER until the exceedance is abated.

3.4 Audit Requirements

- 3.4.1.1 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](#) and the noise control requirements stated in EPD's "*Recommended Pollution Control Clauses for Construction Contracts*" to further minimise the potential noise nuisance during construction phase.

3.5 Commissioning Test for Fixed Plant Noise Sources

- 3.5.1.1 Commissioning test for fixed noise sources should be conducted prior to operation of the proposed submersible water pumps installed under the nullah bed at mid-stream of FTN for ecological enhancement associated water supplement 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 With proper implementation of the recommended pollution control measures, water pollution from the Project would be avoided and minimised and no adverse water quality impacts would be expected during construction and operational phases. Water quality monitoring is therefore not considered necessary. Nonetheless, regular site audit during the construction phase is proposed to inspect the construction activities and works area to ensure the recommended pollution control measures are properly implemented.
- 4.1.1.3 No EM&A requirement is considered necessary during the operational phase.

4.2 Mitigation Measures

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. Precautionary / pollution control measures to avoid and minimise 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.

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 properly implemented during construction phase of the Project.

5 WASTE MANAGEMENT

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 Waste arisings generated during construction activities, such as construction and demolition (C&D) materials, chemical waste and general refuse, are recommended to be audited monthly to ensure that proper storage, transportation and disposal practices are being implemented. 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 environmental audit should be conducted to ensure proper management and handling of waste, and appropriate implementation of the pollution control 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 Architect/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 No unacceptable impacts related to waste management would be anticipated during the operation of the Project. EM&A is considered not 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 Requirement

- 5.3.1.1 Monthly site audit 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 cover site inspection concerning all aspects of on-site waste management practices, including the waste generation, storage, recycling, transportation and disposal. Apart from site inspection, waste management related 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 12](#) 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 would be anticipated. No EM&A is therefore required during the construction or operational phase.

7 SEWERAGE AND SEWAGE TREATMENT IMPLICATIONS

7.1 Introduction

7.1.1.1 An assessment on potential sewerage and sewage treatment implications arising from the Project has been assessed.

7.2 EM&A Requirements

7.2.1.1 Since adverse impact on sewerage and sewage treatment facilities associated with the Project would not be anticipated, no EM&A requirement is considered necessary during the construction or operational phase.

8 ECOLOGY

8.1 Introduction

8.1.1.1 Potential ecological impacts arising from the construction and operational phases of the Project were assessed in the EIA Report. With proper implementation of the recommended mitigation measures and good site practices, no significant adverse ecological impact would be anticipated during construction phase. No specific environmental monitoring for ecology is recommended for this Project. Monthly site audit should be carried out throughout the construction phase to ensure recommended mitigation measures are fully implemented. In case of non-compliance, contractor should be informed to strengthen the proposed mitigation measures accordingly.

8.1.1.2 With ecological enhancement measures incorporated into revitalisation design of FTN, nature of disturbance during operational phase would be minimal compared to existing baseline condition. Net positive ecological outcome would be resulted from the created and enhanced wetland habitats. No unacceptable adverse residual impacts would therefore be expected during the operational phase. No EM&A programme is required during the operational phase.

8.2 Mitigation Measures

8.2.1.1 Mitigation measures for ecological impacts have been recommend in the EIA Report to minimise potential direct and indirect impacts. The implementation schedule of the mitigation measures is given in [Appendix B](#).

8.3 Audit Requirements

8.3.1.1 Site audits should be undertaken on monthly basis to check the proper implementation and maintenance of recommended mitigation measures during construction phase of the Project.

9 FISHERIES

9.1 Introduction

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

9.2 Mitigation Measures

9.2.1.1 Mitigation measures for water quality control recommended in Section 5 of the EIA Report would also serve to protect fisheries resources from indirect impacts. Details of the mitigation measures are presented in [Appendix B](#).

9.3 EM&A Requirements

9.3.1.1 No specific fisheries monitoring and auditing programme is required. Environmental audit requirements for water quality as detailed in **Section 4** of this Manual would be applicable for the protection of the fisheries resources.

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 cultural heritage impact would be anticipated from the construction or operation of the Project. No EM&A is required.

11 LANDSCAPE & VISUAL

11.1 Introduction

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

11.2 Mitigation Measures

11.2.1.1 The implementation schedule of the recommended mitigation measures is presented in [Appendix B](#). The landscape and visual mitigation measures proposed should be incorporated in the detailed landscape and engineering design. The construction phase mitigation measures should be adopted from the commencement of construction and should be in place throughout the entire construction period. Mitigation measures for the operational phase should be adopted during the detailed design and be built as part of the construction works.

11.2.1.2 For the implementation of the proposed measures, a specialist landscape sub-contractor should be employed by the Contractor for the construction of the landscape works and subsequent maintenance operation during post-construction establishment period. A detailed tree survey and topographic survey showing the site conditions should be prepared prior to commencement of works. Detailed tree survey should be prepared by an Arborist accredited by the Hong Kong Institute of Landscape Architects or equivalent employed by the Contractor. For proper implementation of the mitigation measures, a Registered Landscape Architect (RLA) should be employed to check the detailed tree survey and to prepare the Tree Preservation and Removal Proposal (TPRP) in accordance with the EIA Report.

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

11.3 Baseline Review

11.3.1.1 Baseline review to check, record and report the status of the Landscape Resources (LR) and Landscape Character Areas (LCA) within the construction works sites and works areas and the Visually Sensitive Receivers (VSRs) within the visual envelope shall be conducted by the Contractor prior to commencement of any construction works making reference to the LR, LCA and VSRs maps included in the EIA Report.

11.3.1.2 Any significant changes to the status of LR, LCA and VSRs since the EIA shall be identified. The recommended landscape and visual mitigation measures shall be reviewed if such change warrants a change in the design of the landscape and visual mitigation measures.

11.3.1.3 A baseline report including photographic record of the site at the time of the Contractor's possession of the site shall be prepared by the Contractor and approved by the ER. The approved baseline monitoring report including photographic record shall be certified by the ET Leader and verified by the IEC before submitting to EPD and PlanD for records.

11.4 Audit Requirements

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

11.4.1.2 The site audits should be undertaken by the ET at least once every two weeks during the construction period and once every two months for the 12-month post-construction establishment 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.

12 SITE ENVIRONMENTAL AUDIT

12.1 Site Inspection

- 12.1.1.1 Site inspection provides a direct means to trigger and enforce the specified environmental protection and pollution control measures. 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.
- 12.1.1.2 The ET is responsible for formulation of the environmental site inspection, deficiency and remedial action reporting system, and for carrying out the site inspection works. He shall submit a proposal for site inspection and deficiency and remedial action reporting procedures to the Contractor for agreement, and to the ER for approval. The ET's proposal for rectification would be made known to the IEC.
- 12.1.1.3 Regular site inspections shall be carried out during the construction phase. The areas of inspection shall not be limited to the environmental situation, pollution control and mitigation measures within the site. It shall also review the environmental situation outside the site area that is likely to be affected, directly or indirectly, by the site activities. The ET shall make reference to the following information in conducting the inspection:
- the EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
 - ongoing results of the EM&A program;
 - works progress and programme;
 - individual works methodology proposals (which shall include proposal on associated pollution control measures);
 - the contract specifications on environmental protection;
 - the relevant environmental protection and pollution control laws; and
 - previous site inspection results undertaken by the ET and others.
- 12.1.1.4 The Contractor shall update the ET Leader with all relevant information on the construction contract necessary for him to carry out the site inspections. The inspection results and associated recommendations for improvements to the environmental protection and pollution control works shall be submitted to the IEC and the Contractor within 24 hours, for reference and for taking immediate remedial action. The Contractor shall follow the procedures and timeframe as stipulated in the environmental site inspection, deficiency and remedial action reporting system formulated by the ET Leader, to report on any remedial measures subsequent to the site inspections.
- 12.1.1.5 The ET shall also carry out *ad hoc* site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Event and Action Plan for environmental monitoring and audit.

12.2 Compliance with Legal and Contractual Requirements

- 12.2.1.1 There are contractual environmental protection and pollution control requirements as well as environmental protection and pollution control laws in Hong Kong with which the construction activities shall comply.
- 12.2.1.2 In order that the works are in compliance with the contractual requirements, all the works method statements submitted by the Contractor to the ER for approval shall be sent to the ET Leader for vetting to see whether sufficient environmental protection and pollution control measures have been included.
- 12.2.1.3 The ET Leader shall also review the progress and programme of the works to check that relevant environmental laws have not been violated and that the any foreseeable potential for violating the laws can be prevented.
- 12.2.1.4 The Contractor shall regularly copy relevant documents to the ET Leader so that the checking work can be carried out effectively. The documents shall at least include the updated Work

Progress Reports, the updated Works Programme, application for any necessary licence/permits under the relevant environmental protection laws, and all the valid licence/permits received to date. The site diary shall also be available for the ET Leader's inspection upon his request.

12.2.1.5 After reviewing the documents, the ET Leader shall advise the ER and the Contractor of any non-compliance with the contractual and legislative requirements on environmental protection and pollution control for them to take follow-up actions. If the ET Leader's review concludes that the current status on licence/permit application and any environmental protection and pollution control preparation works may not cope with the works programme or may result in potential violation of environmental protection and pollution control requirements, he shall also advise the Contractor and the ER accordingly.

12.2.1.6 Upon receipt of the advice, the Contractor shall undertake immediate action to remedy the situation. The ER shall follow up to ensure that appropriate action has been taken by the Contractor in order that the Project's environmental protection and pollution control requirements are fulfilled.

12.3 Environmental Complaints

12.3.1.1 Complaints shall be referred to the ET Leader for carrying out complaint investigation procedures. 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.

13 REPORTING

13.1 Introduction

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

13.1.1.2 ET Leader shall submit baseline monitoring report, monthly EM&A report, 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.

13.2 Electronic Reporting of EM&A Information

13.2.1.1 To facilitate public inspection of the baseline monitoring report and various EM&A reports via the EIAO Internet website and at the EIAO register office, electronic copies of these reports shall be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF Adobe 11 Pro version or later), unless otherwise agreed by EPD and shall be submitted at the same time as the hardcopies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of these reports shall be included at the beginning of the document. Hyperlinks to all figures, drawings and tables in these reports shall be provided in the main text from where the respective references are made. All graphics in these reports shall be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of these reports must be the same as the hard copies. The summary of the monitoring data taken shall be included in the various EM&A Reports to allow for public inspection via the EIAO Internet website.

13.3 Baseline Monitoring Report

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

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

- i. up to half a page executive summary;
- ii. brief project background information;
- iii. drawings showing locations of the baseline monitoring stations;
- iv. an updated construction programme with milestones of environmental protection / mitigation activities annotated;
- v. monitoring results (in both hard and soft copies) together with the following information:
 - monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - parameters monitored;
 - monitoring locations (and depth);
 - monitoring date, time, frequency and duration; and
 - quality assurance (QA) / quality control (QC) results and detection limits.
- vi. details on influencing factors, including:
 - major activities, if any, being carried out on the site during the period;
 - weather conditions during the period; and
 - other factors which might affect results.
- vii. determination of the Action and Limit Levels (AL levels) for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if

- there is any significant difference between control and impact stations for the parameters monitored;
- viii. revisions for inclusion in the EM&A Manual; and
 - ix. comments, recommendations and conclusions.

13.4 Monthly EM&A Reports

13.4.1 General

- 13.4.1.1 The results and finding of all EM&A work required in the Manual shall be recorded in the monthly EM&A reports prepared by the ET Leader and submitted to IEC for agreement and to EPD for approval. 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 approved monthly EM&A report shall be submitted to the parties: the Contractor, the IEC, the ER and EPD. Before submission of the first EM&A report, the ET Leader shall liaise with the parties on the required number of copies and format of the monthly reports in both hard copy and electronic copies.
- 13.4.1.2 The ET leader shall review the number and location of monitoring stations and parameters every six months, or on as needed basis, in order to cater for any changes in the surrounding environment and the nature of works in progress.

13.4.2 First Monthly EM&A Report

- 13.4.2.1 The first monthly EM&A Report shall be included at least the following:
- i. executive summary (1-2 pages):
 - breaches of AL levels;
 - complaint log;
 - notifications of any summons and successful prosecutions;
 - reporting changes; and
 - future key issues.
 - ii. basic project information:
 - project organisation including key personnel contact names and telephone numbers;
 - construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection/mitigation measures for the month;
 - management structure, and
 - works undertaken during the reporting month.
 - iii. environmental status:
 - works undertaken during the month with illustrations (such as location of works, daily dredging/filling rates, percentage of fines in the fill materials used, etc.); and
 - drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations (with co-ordinates of the monitoring locations).
 - iv. a brief summary of EM&A requirements including:
 - all monitoring parameters;
 - environmental quality performance limits (AL levels);
 - Event-Action Plans;
 - environmental mitigation measures, as recommended in the Final EIA report; and
 - environmental requirements in contract documents.
 - v. implementation status:

- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the Final EIA report.
- vi. monitoring results (in both hard and soft copies) together with the following information:
- monitoring methodology;
 - name of laboratory and types of equipment used and calibration details;
 - monitoring parameters;
 - monitoring locations;
 - monitoring date, time, frequency, and duration;
 - weather conditions during the period;
 - graphical plots of the monitored parameters;
 - major activities being carried out on site during the period;
 - any other factors which might affect the monitoring results; and
 - QA / QC results and detection limits.
- vii. report on non-compliance, complaints, notifications of summons and successful prosecutions:
- record of all non-compliance (exceedances) of the environmental quality performance limits (AL levels);
 - record of all complaints received (written or verbal) including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
 - record of all notification of summons and successful prosecutions for breaches of current environmental protection / pollution control legislations, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;
 - review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
 - description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
- viii. others:
- an account of the future key issues as reviewed from the works programme and work method statements;
 - advice on the solid and liquid waste management status;
 - a forecast of the works programme, impact predictions and monitoring schedule for the next reporting month;
 - compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies; and
 - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.

13.4.3 Subsequent monthly EM&A Reports

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

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

- future key issues.

Basic project information:

- project organisation and management structure;
- construction programme; and
- works undertaken during the reporting month.

ii. environmental status:

- construction programme with fine tuning of construction activities showing the inter-relationship with environmental protection / mitigation measures for the month;
- works undertaken during the reporting month with illustrations (e.g. location of works, etc.); and
- drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring stations.

iii. implementation status:

- advice on the implementation status of environmental protection and pollution control / mitigation measures, as recommended in the Final EIA report, summarised in the updated implementation schedule.

iv. monitoring results (in both hard and diskette copies) together with the following information:

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

v. report on non-compliance, complaints, and notifications of summons and successful prosecutions:

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

vi. others:

- an account of the future key issues as reviewed from the works programme and work method statements;

- advice on the solid and liquid waste management status;
 - a forecast of the works programme, impact predictions and monitoring schedule for the next reporting months;
 - compare and contrast the EM&A data with the EIA predictions and annotate with explanation for any discrepancies; and
 - comments (for examples, effectiveness and efficiency of the mitigation measures), recommendations (for example, any improvement in the EM&A programme) and conclusions.
- vii. appendix
- Action and Limit levels;
 - graphical plots of trends of monitored parameters at key stations over the past four reporting periods for representative monitoring stations annotated against the following:
 - major activities being carried out on site during the period;
 - weather conditions during the period; and
 - any other factors that might affect the monitoring results.
 - cumulative statistics on complaints, notifications of summons and successful prosecutions;
 - outstanding issues and deficiencies

13.5 Final Summary EM&A Report

13.5.1.1 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. No EM&A requirement is considered necessary during the operational phase.

13.5.1.2 Prior to the proposed termination, it may be advisable to consult relevant local communities. The proposed termination should only be implemented after the proposal has been endorsed by the IEC, the Engineer and the Project proponent followed by final approval from the Director of Environmental Protection.

13.5.1.3 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.

13.6 Data Keeping

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

13.7 Interim Notifications of Environmental Quality Limit Exceedances

13.7.1.1 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](#).