Expansion of Sha Tau Kok Sewage Treatment Works

Environmental Monitoring and Audit Manual

August 2016

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ANNEX

1. INTRODUCTION

1.1 Purpose of the Manual

1.1.1 This Environmental Monitoring and Audit (EM&A) Manual ("the Manual") has been prepared by Black&Veatch on behalf of Drainage Services Department (hereinafter referred to as DSD). The Manual is a supplementary document of the Environmental Impact Assessment (EIA) Study of the expansion of Sha Tau Kok Sewage Treatment Works (hereafter referred to as the Project).

1.1.2 The Manual has been prepared in accordance with the EIA Study Brief (No. ESB-253/2012) and the Technical Memorandum of the Environmental Impact Assessment Process (EIAO-TM). The purpose of the Manual is to provide information, guidance and instruction to personnel charged with environmental duties and those responsible for undertaking EM&A work during construction and operation. It provides systematic procedures for monitoring and auditing of potential environmental impacts that may arise from the works.

1.1.3 This Manual contains the following information:

- Responsibilities of the Contractor(s), Environmental Team (ET), and the Independent Environmental Checker (IEC) with respect to the environmental monitoring and audit requirements during the course of the project;
- Project organisation;
- Requirements with respect to the construction and operational programme schedule and the necessary environmental monitoring and audit programme to track the varying environmental impact;
- Details of the methodologies to be adopted including field, laboratory and analytical procedures, and details on quality assurance and quality control programme;
- Preliminary 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 exceedances of applicable criteria and/or receive of complaints;
- Requirements for presentation of environmental monitoring and audit data and appropriate reporting procedures; and
- Requirements for review of EIA predictions and the effectiveness of the mitigation measures/environmental management systems and the EM&A programme.

1.1.4 For the purpose of this manual, the ET Leader (ETL), who will be responsible for and in charge of the ET, will refer to the person delegated the role of executing the EM&A requirements.

1.1.5 This Manual is considered to be a working document and should be reviewed periodically and updated if necessary during the course of implementing the Project.

1.2 Project Description

1.2.1 The works for this Project in Sha Tau Kok mainly comprises of the following items:

- Increase the treatment capacity of Sha Tau Kok Sewage Treatment Works (STKSTW) to 5,000 m3/day at ADWF by 2020, with suitable allowance to cater for a further increase of treatment capacity to 10,000 m3/day at ADWF after 2030 in Phase 2;
- Construct a temporary sewage treatment plant (TSTP);
- Demolish the existing Sha Tau Kok Sewage Pumping Station (STKSPS) and decommission the rising main between STKSPS and STKSTW;
- Construct a new gravity sewer; and
- Decommission the existing submarine outfall and construct a new one.

1.2.2 The following elements of the Project are classified as Designated Projects under the Environmental Impact Assessment Ordinance (Cap. 499) (EIAO) and are addressed in this EIA Report:

- Schedule 2, Part I, Item F.2 (a) and (b)(i) - Sewage Treatment Works with an installed capacity of more than 5,000 m3 per day; and a boundary of which is less than 200 m from the nearest boundary of the an existing residential area; and
- Schedule 2, Part I, Item F.6 - a submarine outfall.

1.2.3 The Project site for expansion of the STKSTW will be within the existing STKSTW while the construction of the gravity sewers and demolition of STKSPS will be carried out in Sha Tau Kok Town. The proposed submarine outfall will be constructed by Horizontal Directional Drilling (HDD) method under the sea bed of Starling Inlet.

1.2.4 The location of the Project are shown in **Figure 1.1**.

1.3 Objective of the EM&A Programme

1.3.1 The broad objective of this EM&A Manual is to define the procedures of the EM&A programme for monitoring the environmental performance of the Project during design, construction and operation. The construction and operational impacts arising from the implementation of the Project are specified in the EIA Report. The EIA Report also specifies mitigation measures and construction practices that may be needed to confirm compliance with the environmental criteria. These mitigation measures and their implementation requirements are presented in the Implementation Schedule of Mitigation Measures (**Annex A**).

1.3.2 The main objectives of the EM&A programme are to:

- provide a database of environmental parameters against which to determine any short term or long term environmental impacts;
- provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- confirm that the mitigation recommendations of the EIA are included in the design of the project;
- clarify and identify potential sources of pollution, impact and nuisance arising from the works for the responsible parties;
- confirm compliance with regulatory requirements, contract specifications and EIA study recommendations;

- confirm compliance of environmental designs during the design phase of the Project with the specifications stated in the EIA Report and the EP;
- monitor performance of the mitigation measures and to assess their effectiveness;
- take remedial action if unexpected issues or unacceptable impacts arise;
- verify the environmental impacts predicted in the EIA; and
- audit environmental performance.

1.3.3 EM&A procedures are required during the design, construction and operational phases of the project implementation and a summary of the requirements for each of the environmental parameters is detailed in Table 1.1.

Table 1.1 - Summary of EM&A Requirements

Parameters	EM&A Phase		
	Design Phase(1) (2)	Construction Phase	Operation Phase
Air Quality	✓	✓(SI)	✓
Noise	✓	✓	—
Water Quality	✓	✓	✓
Waste Management	—	✓(SI)	—
Ecology (Terrestrial and Aquatic)	—	✓(SI)	—
Fisheries	✓	✓	✓
Landscape and Visual	✓	✓	✓
Cultural Heritage	—	✓	—

Notes:
" (SI) "= Site Inspection forms the main checking method; " — " = no EM&A required

(1) Pre-construction monitoring may overlap the design phase.
(2) EM&A requirements in the design phase shall include confirmation on the compliance for environmental designs which were specified in the EIA Report and the EP for all parameters.

1.4 The Scope of the EM&A Programme

1.4.1 The scope of this EM&A programme is to:

- establish baseline noise and water quality levels at specified locations and implement monitoring requirements for noise and water quality monitoring programme;
- implement inspection and audit requirements for air quality;
- implement inspection and audit requirements for waste management;
- implement inspection and audit requirements for ecological mitigation measures;
- implement inspection and audit requirements for landscape and visual mitigation measures;
- implement inspection and audit requirements for cultural heritage mitigation measures;

- liaise with, and provide environmental advice (as requested or when otherwise necessary) to construction site staff on the significance and implications of the environmental monitoring data;
- identify and resolve environmental issues and other functions as they may arise from the works;
- check and quantify the Contractor(s)' s overall environmental performance;
- implementation of Event and Action Plans (EAPs), and remedial actions taken to mitigate adverse environmental effects as they may arise from the works;
- conduct monthly reviews of monitored impact data as the basis for assessing compliance with the defined criteria and to verify that necessary mitigation measures are identified and implemented, and to undertake additional ad hoc
- monitoring and auditing as required by special circumstances;
- evaluate and interpret environmental monitoring data to provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards, and to verify the environmental impacts predicted in the EIA;
- manage and liaise with other individuals or parties concerning other environmental issues deemed to be relevant to the construction process;
- conduct regular site inspections and audits of a formal or informal nature to assess:
  - (i) the level of the Contractor(s)'s general environmental awareness;
  - (ii) the Contractor(s)'s implementation of the recommendations in the EIA and their contractual obligations;
  - (iii) the Contractor(s)'s performance as measured by the EM&A;
  - (iv) the need for specific mitigation measures to be implemented or the continued usage of those previously agreed; and
  - (v) to advise the site staff of any identified potential environmental issues.
- produce monthly EM&A reports which summarise project monitoring and auditing data, with full interpretation illustrating the acceptability or otherwise of any environmental impacts and identification or assessment of the implementation status of agreed mitigation measures.

1.5 Works Programme & Works Locations

1.5.1 The locations of works are shown in **Figure 1.1**. The preliminary construction programme is given in **Figure 1.2**.

1.6 Organization and Structure of the EM&A Process

1.6.1 The proposed organisation of the personnel involved in the EM&A process is illustrated in **Figure 1.3**.

1.6.2 The roles and responsibilities of the various parties are summarised below:

- **Drainage Services Department (DSD)** is the Project Proponent who shall appoint an Environmental Team (ET) and Independent Environmental Checker (IEC) to undertake the EM&A requirements under this Project.
- **Environmental Protection Department (EPD)** is the statutory enforcement body for environmental protection matters in Hong Kong.

- The **Engineer's Representative (ER)** shall appoint an appropriate member of the resident site staff, who shall:

  (i) Supervise the ET;

  (ii) Monitor the Contractor's compliance with the contract specifications, including the EM&A programme, and the effective implementation and operation of environmental mitigation measures in a timely manner;

  (iii) Ensure that impact monitoring is conducted at the correct locations at the correct frequency as identified in the EM&A programme;

  (iv) Instruct the Contractor to follow the agreed protocols or those In the Contract Specifications in the event of exceedances or complaints;

  (v) Review the programme of works with a view to identifying any potential environmental impacts before they arise;

  (vi) Check that mitigation measures that have been recommended in the approved EIA Report, this document and contract documents, or as required, are correctly implemented in a timely manner, when necessary;

  (vii) Report the findings of site audits and other environmental performance reviews to DSD;

  (viii) Verify the environmental acceptability of permanent and temporary works, relevant design plans and submissions; and

  (ix) Comply with the agreed Event and Action Plan in the event of any exceedance.

- The **Independent Environmental Checker (IEC)** shall advise the ER on environmental issues related to the project. The IEC shall not be in any way an associated body of the ER, the Contractor or the ET for the Project. The IEC shall be empowered to audit from an independent viewpoint the environmental performance during the construction of the Project. The IEC shall be a person who has relevant professional qualifications in environmental control and at least 7 years experience in EM&A and environmental management.

  The IEC should be supported by a team, similar to the ET Leader. The IEC shall be approved by EPD before his appointment. The Project Proponent shall provide a site office to the IEC and his team for use. The IEC shall report directly to EPD. The IEC shall accompany EPD in carrying out site inspections and offer objective and professional advice on environmental issues when requested. The IEC shall notify EPD emergency events relating to violation of environmental legislation or non-compliance with the recommendations of the approved EIA Report, which might affect the monitoring or control of adverse environmental impacts from the Project. The IEC shall allocate adequate resources for discharging the duties required. The minimum on-site time for the IEC or his team should be agreed with EPD.

  The IEC shall submit to EPD for approval before the commencement of the construction of the Project, a proposal on the reporting mechanism, covering how the IEC and the team would:

(i) discharge all the duties specified under the EM&A programme, taking into account the Project's construction activities and programme;
(ii) report to EPD any observations, findings, conclusions and recommendations reached during discharge of the duties;
(iii) respond to questions and enquiries from EPD; and
(iv) maintain close liaison with EPD.

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 Environmental Permit. 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 logbook 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 noncompliance with the approved EIA Report or the EP, which might affect the monitoring or control of adverse environmental impact.

The main duties of the IEC are to carry out independent environmental audit of the project. This shall include, inter alias, the following:

(i) Review and audit in an independent, objective and professional manner in all aspects of the EM&A programme;

(ii) 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;

(iii) Carry out random sample check and audit on monitoring data and sampling procedures, etc.;

(iv) Conduct random site inspection (at least once a month);

(v) Audit the approved EIA Report recommendations and EP requirements against the status of implementation of environmental protection measures on site;

(vi) Review the effectiveness of environmental mitigation measures and environmental performance of the Project;

(vii) On an as needed basis, verify and certify the environmental acceptability of the construction methodology (both temporary and permanent works), relevant design plans and submissions under the environmental permit. Where necessary, the IEC shall agree in consultation with the ET Leader and the Contractor the least impact alternative;

(viii) Verify investigation results of complaint cases and the effectiveness of corrective measures;

(ix) Verify EM&A reports submitted and certified by the ET Leader; and

(x) Feedback audit results to ER/ ET by signing according to the Event/ Action Plans specified in this Manual.

- An **Environmental Team (ET)** headed by an ET Leader and supported by an Odour Specialist, a Noise Specialist, a Water Quality Specialist, a Terrestrial Ecologist, a Marine Ecologist and a Registered Landscape Architect, shall be appointed by the Project Proponent to carry out the recommended EM&A programme for the Project. The ET shall be directly supervised by the Engineer's Representative (ER) of the Project and shall not be in any way an associated body of the Contractor or the IEC for the Project. The Project Proponent shall provide a site office to the ET Leader and ET for use. The ET Leader and ET shall be responsible for carrying out site inspections to audit the Contractor's site practice and work methodologies with respect to environmental mitigation measures contained in the EM&A Manual of the Project and to take pro-active actions to pre-empt environmental problems. The ET Leader shall plan, organise and manage the implementation of the EM&A programme, and ensure that the EM&A works are undertaken to the required standards. The ET Leader shall have relevant professional qualifications in environmental control and possess at least 7 years experience in EM&A and/or environmental management subject to the approval of the ER. Other supporting specialists shall possess at least 3 years experience in their specialist/professional aspects subject to the approval of their employer.

  The ET Leader shall be responsible for the implementation of the EM&A programme in accordance with the EM&A requirements specified in this Manual and the EP. The ET Leader shall keep a contemporaneous logbook for recording each and every instance or circumstance or change of circumstances that may affect the compliance with the recommendations of the approved EIA report. This logbook shall be kept readily available for inspection by the IEC and Director of Environmental Protection (DEP) or his authorised officers. The minimum on-site time for the ET Leader and ET should be agreed with EPD.

  Sufficient and suitably qualified professional and technical staff shall be employed to ensure full compliance with their duties and responsibility, as required under the EM&A programme for the duration of the Project.

  Specialist(s) shall form part of the ET to carry out work relating to specific environmental aspects (as detailed in the Manual) including but not limited to auditing the implementation of mitigation measures to ensure compliance with the recommendations of the approved EIA Report and to certify submissions as required in the EP. The qualification and experience of the specialist(s) shall be certified by the ET Leader and verified by the IEC.

  The broad categories of works of the ET comprise the following:

  (i) To monitor the various environmental parameters as required by the EM&A programme;

  (ii) To follow up and close out of the non-compliance actions;

  (iii) To investigate and audit the Contractor's equipment and work methodologies with respect to pollution control and environmental

mitigation, and to anticipate environmental issues that may require mitigation before the problem arises;

(iv) To audit and prepare audit reports on the environmental monitoring data and the site environmental conditions;

(v) To review the EM&A programme after the collection and analysis of the baseline data;

(vi) To modify the EM&A programme in terms of parameters, sites, sample sizes, frequency etc. if appropriate in consultation with the ER and EPD; and

(vii) To report the environmental monitoring and audit results to the IEC, Contractor and the ER.

- The **Contractor** shall assign an on-site environmental coordinator to oversee Contractor's environmental performance and the implementation of the EM&A duties. The coordinator shall be a person who has relevant professional qualifications in environmental control and is subject to approval by the ER.

  The broad categories of works of the Contractor comprise the following:

  (i) Work within the scope of the construction contract and other tender conditions with respect to environmental requirements;

  (ii) Operate and strictly adhere to the guidelines and requirements in this EM&A programme and contract specifications;

  (iii) Provide assistance to ET in carrying our monitoring;

  (iv) Participate in the site inspections undertaken by the ET as required, and undertake correction actions;

  (v) Provide information / advice to the ET regarding works activities which may contribute, or be continuing to the generation of adverse environmental conditions;

  (vi) Submit proposals on mitigation measures in case of exceedances of Action and Limit levels in accordance with the Event / Action Plans;

  (vii) Implement measures to reduce impact where Action and Limit levels are exceeded; and

  (viii) Adhere to the procedures for carrying out complaint investigation.

The Contractor should also participate in the environmental performance review undertaken by the ER and undertake any corrective actions as instructed by the ER.

1.7 Structure of the EM&A Manual

1.7.1 The remainder of this Manual is set out as follows:

- Section 2 sets out the EM&A general requirements;
- Section 3 details the requirements for air quality audit;
- Section 4 details the requirements for noise monitoring;
- Section 5 details the requirements for water quality monitoring;

- Section 6 details the requirements for waste management audit;
- Section 7 details the requirements for ecological mitigation measures;
- Section 8 details the requirements for fisheries mitigation measures;
- Section 9 details the requirements for landscape and visual mitigation measures;
- Section 10 details the requirements for cultural heritage;
- Section 11 describes the scope and frequency of site auditing;
- Section 12 details the EM&A reporting requirements;
- **Annex A** contains the implementation schedule summarising all mitigation measures proposed in the approved EIA Report with updates from the ER Report; and
- **Annex B** contains the monitoring and complaint log sheets.

1.7.2 This Manual is an evolving document that should be updated to maintain its relevance as the Project progresses. The primary focus for these updates will be to ensure the impacts predicted and the recommended mitigation measures remain consistent and appropriate to the manner in which the works are to be carried out.

2. GENERAL REQUIREMENT

2.1 Introduction

2.1.1 In this section, the general requirements of the EM&A programme for the Project are presented. The scope of the programme is developed with reference to the findings and recommendations of the EIA Report.

2.2 Construction Phase

2.2.1 The environmental issues, which were identified during the EIA process and are associated with the construction phase of the Project will be addressed through the monitoring and controls specified in this EM&A Manual and in the construction contracts.

2.2.2 During the construction phases of the Project, air quality, noise, water quality, waste management and landscape and visual will be subject to EM&A, with environmental monitoring being undertaken for noise and water quality as determined in the EIA. Monitoring of the effectiveness of the mitigation measures will be achieved through the environmental monitoring programme as well as through site inspections. The inspections will include within their scope, mechanisms to review and assess the Contractor(s)'s environmental performance, ensuring that the recommended mitigation measures have been properly implemented, and that the timely resolution of received complaints are managed and controlled in a manner consistent with the recommendations of the EIA Report.

Environmental Monitoring

2.2.3 The environmental monitoring work throughout the Project period will be carried out in accordance with this EM&A and reported by the ET. Monitoring works will comprise of quantitative assessment of physical parameters, such as water quality and noise, which also form an important part of the whole monitoring programme. The monitoring programme will be conducted at the chosen representative sensitive receivers in the vicinity of the construction site.

Action and Limit Levels

2.2.4 Action and Limit (A/L) Levels are defined levels of impact recorded by the environmental monitoring activities which represent levels at which a prescribed response is required. These Levels are quantitatively defined later in the relevant sections of this manual and described in principle below:

- **Action Levels**: beyond which there is a clear indication of a deteriorating ambient environment for which appropriate remedial actions are likely to be necessary to prevent environmental quality from falling outside the Limit Levels, which would be unacceptable; and
- **Limit Levels**: statutory and/or agreed contract limits stipulated in the relevant pollution control ordinances, HKPSG or Environmental Quality Objectives established by the EPD. If these are exceeded, works will not proceed without appropriate remedial action, including a critical review of plant and working methods.

Event and Action Plans

2.2.5 The purpose of the Event and Action Plans (EAPs) is to provide, in association with the monitoring and audit activities, procedures for ensuring that if any significant environmental incident occurs, the cause will be quickly identified and remediated. This also applies to the exceedances of A/L criteria identified in the EM&A programme.

Site Inspections

2.2.6 In addition to monitoring; as a means of assessing the ongoing performance of the Contractor(s), the ET will undertake site inspections and audits of the compliance with stipulated procedures and on-site practices. The primary objective of the inspection and audit programme will be to assess the effectiveness of the environmental controls established by the Contractor(s) and the implementation of the environmental mitigation measures recommended in the EIA Report. The IEC will undertake site inspection and audit on as need basis to assess the performance of the Contractor(s).

2.2.7 Whilst the audit and inspection programme will complement the monitoring activity, the criteria against which the audits will be undertaken will be derived from the Clauses within the Contract Documents which seek to enforce the recommendations of the EIA Report and the EM&A Manual.

2.2.8 The findings of site inspections and audits will be made known to the Contractor(s) at the time of the inspection to enable the rapid resolution of identified non-conformities. Non-conformities, and the corrective actions undertaken, will also be reported in the monthly EM&A Reports.

2.2.9 Section 11 of this Manual presents details of the scope and frequency of on-site inspections and defines the range of issues that the audit protocols will be designed to address.

Enquiries, Complaint and Requests for Information

2.2.10 Enquiries, complaints and requests for information may occur from a wide range of individuals and organisations including members of the public, Government departments, the press and community groups.

2.2.11 All enquiries concerning the environmental impacts of the Project, irrespective of how they are received, should be reported to the Project Proponent and IEC and directed to the Contractor and ET who should set up procedures for handling, investigation and storage of such information. The following steps should be followed:

(i) The ET Leader should notify the IEC and ER of the nature of the enquiry.

(ii) An investigation should be initiated to determine the validity of the complaint and to identify the source(s) of the problem.

(iii) The ET Leader and the Contractor should undertake the following steps, as necessary:

- investigate and identify source(s) of the problem;
- if considered necessary by Project Proponent following consultation with the IEC, undertake additional monitoring to verify the existence and severity of the alleged complaint;
- identify necessary remedial measures and implement as soon as possible;
- if the complaint is transferred from EPD, submit interim report to EPD on status of the complaint investigation and follow-up action within the time frame assigned by EPD;
- repeat the monitoring to verify effectiveness of mitigation measures; and,
- repeat review procedures to identify further possible areas of improvement if the repeat monitoring results continue to substantiate the complaint.

(iv) The outcome of the investigation and the action taken will be documented on a complaint log (**Annex B**). A formal response to each complaint received will be prepared by the Contractor(s) within five working days and submitted to Project Proponent, in order to notify the concerned person(s) that action has been taken. All enquiries/complaints that trigger this process should be reported in the monthly EM&A reports, which should include results of investigations undertaken by the ET Leader and the Contractor, and details of the measures taken, and additional monitoring results (if deemed necessary). It should be noted that the receipt of complaint or enquiry should not be, in itself, a sufficient reason to introduce additional mitigation measures.

2.2.12 During the complaint investigation work, the Contractor and ER shall cooperate with the ET Leader in providing all necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor shall promptly carry out the mitigation. The ER shall ensure that the measures have been carried out by the Contractor.

Reporting

2.2.13 Baseline, construction phase and operation phase monitoring, monthly, and annual/final reports will be prepared and certified by the ET Leader and verified by the IEC. The reports will be submitted to the DSD, Contractor(s), ER and EPD. The monthly reports will be prepared and submitted within two weeks of the end of each calendar month.

Termination of EM&A

2.2.14 The termination of EM&A programme is subject to the satisfactory completion of the EM&A Final Report, agreement with the IEC and approval from EPD. The proposed termination may require consultation with local community and stakeholders. The termination of EM&A programme shall be determined on the following basis:

(a) completion of construction activities and insignificant environmental impacts of the remaining outstanding construction works;

(b) trends analysis to demonstrate the narrow down of monitoring exceedances due to construction activities and the return of ambient environmental conditions in comparison with baseline data; and

(c) no environmental complaint and prosecution involved.

2.3 Operation Phase

2.3.1 Based on the findings of the EIA, air quality monitoring during operation phase is considered necessary. During the operation phase, a commissioning test is recommended to be conducted to ascertain the effectiveness of the odour control measures at the TSTP and STKSTW during their operation. Odour patrol is also proposed during the period of maintenance of the deodorization system for TSTP or STKSTW.

2.3.2 Based on the findings of the EIA, water quality monitoring during operation phase is considered necessary. Monitoring of any planting works should also continue over their establishment period, which may extend into the operation phase, and will be covered by regular site inspections. Other operational licenses will require specific monitoring or audit conditions or practices, and a non EIA EM&A practice will need to be put in place.

2.3.3 An Emergency Response Plan have been prepared and shall be implemented in the event of emergency. Relevant government departments shall be informed as soon as possible of any emergency conditions.

3. AIR QUALITY

3.1 Introduction

3.1.1 In this section, the EM&A requirements during the construction phase and the operation phase of the Project are presented. The EM&A requirements have been developed with reference to the findings and recommendations of the EIA Report.

3.2 Construction Phase

3.2.1 The EIA study concluded that no adverse air quality or odour impacts on the identified air sensitive receivers (ASRs) are anticipated given that the recommended dust control measures and good construction site practices are implemented. Therefore, dust monitoring or odour monitoring is considered not necessary during the construction phase of the Project.

3.2.2 Regular site inspections and audits will be carried out during the construction phase in order to confirm that the mitigation measures are implemented and are working effectively. The Contractor(s) will be responsible for the design and implementation of the mitigation measures which are presented in **Annex A**.

3.3 Operation Phase

Odour Monitoring

3.3.1 In accordance with EIA recommendations, commissioning test for the TSTP and STKSTW is recommended to be performed prior to their operation to ascertain the effectiveness of the deodorization systems at the TSTP and STKSTW during the operation phase. Exhaust air flow rate, temperature of exhaust, odour concentrations at the outlet of the deodorization systems should be monitored during the commissioning test. The exhaust air flow rate, temperature of exhaust, odour concentrations presented in **Table 3.1** should be maintained. The recommended method for the odour monitoring is presented in **Table 3.2**.

Table 3.1 – Design Parameter of Exhaust Stack and Odour Emission Rates of TSTP and STKSTW

Design Parameter	Unit	STKSTW		TSTP	
Location	-	STKSTW No.1	STKSTW No.2	TSTP No.1	TSTP No.2
No. of emission points	-	1 (a)		2	
Building height	m above ground	15.65		14.3	14.3
Stack height	m above ground	17.65		16.3	16.3
Equivalent stack diameter	m	1.69		0.15	0.25
Exit temperature	-	ambient		ambient	ambient
Total flowrate @ exit temp.	m^3hr^{-1}	70,279	46,722	3,952	9,293
	m^3s^{-1}	19.52	12.98	1.10	2.58
Exit velocity	ms^{-1}	14.44		15.53	13.15
Maximum H_2S emission concentration at inlet	ppm	10	10	10	50
% of odour removal	%	99.3	99.3	99.5	99.8
Mitigated H_2S emission concentration at exhaust	ppm	0.07	0.07	0.05	0.1
Mitigated odour emission concentration at exhaust	OUm^{-3}	148.9	148.9	106.4	212.8
Mitigated odour emission rate	OUs^{-1}	4840.4 (b)		116.8	549.2

Notes:

(a) Same emission point for STKSTW No.1 and STKSTW No.2.

(b) Combined emission rate for STKSTW No.1 and STKSTW No.2.

Table 3.2 – Odour Monitoring Methodology

Monitoring Location	Parameter	Recommended Method
Stack of TSTP or STKSTW	• Exhaust air flow rate • Temperature of exhaust • Odour	Air sampling: • grab sampling using Teflon bag Physical parameter: • flow meter Laboratory analysis: • Forced-choice Dynamic Olfactometer according to European Standard Method (EN 13725)

3.3.2 Weekly monitoring of odour emission at the exhausts at TSTP and STKSTW by taking odour samples is recommended to be conducted in the first two months of the first year of the operation. The monitoring parameter will include exhaust flow rate, temperature of exhaust and odour concentrations, following the recommended monitoring method as presented in **Table 3.2**. The monitoring results should be compared with that presented in **Table 3.1**. Provided that the monitoring results show no non-compliance on a weekly basis during the first two months, it is recommended to reduce the frequency to monthly in the subsequent four months and further reduce to quarterly in the remaining six months of the first year if no non-compliance is found. If there is any non-compliance, the operator should inspect the deodorization unit. Frequency of odour monitoring should not be reduced unless no non-compliance is found. Quarterly odour monitoring is also recommended to continue in the second year of the operation. If monitoring in the first two years of operation shows that compliance can be achieved consistently, the Project Proponent may propose and seek approval with EPD to reduce monitoring frequency to every six-month or yearly basis throughout the year for subsequent years of operation. The number of subsequent years of operation should also be agreed with EPD.

Odour Patrol

3.3.3 Odour patrol is proposed during the period of maintenance or cleaning of the deodorization system for TSTP or STKSTW to monitor the odour impacts. Odour patrols will be conducted by an odour patrol team. The odour patrol team will patrol and sniff along an odour patrol route at the existing STKSTW 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.

3.3.4 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.

3.3.5 The independent trained personnel / competent persons should use their noses (olfactory sensors) to sniff odours at different locations. The main odour emission sources and the areas to be affected by the odour nuisance shall be identified. During the patrol, the sequence should start from less odorous locations to stronger odorous locations.

3.3.6 The perceived odour intensity is divided into 5 levels. **Table 3.3** describes the odour intensity for different levels.

Table 3.3 – 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

3.3.7 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.

3.3.8 **Table 3.4** shows the action and limit level to be used for the odour patrol. Should any exceedance of the action or limit level occurs, actions in accordance with the event and action plan presented in **Table 3.5** should be carried out.

Table 3.4 – Action and Limit Levels for Odour Nuisance

Parameter	Action Level	Limit Level

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

Note:
(a) The Action and Limit Levels for Odour Nuisance are referenced from the EM&A Manual of the approved EIA Report for Harbour Area Treatment Scheme (HATS) Stage 2A Environmental Impact Assessment Study – Investigation (AEIAR-121/2008).

Table 3.5 – Event and Action Plan for Odour Monitoring

Event	Action	
	Person-in-charge of Odour Monitoring	**Project Proponent**
Action Level	1. Identify source/reason of exceedance; 2. Repeat odour patrol to confirm finding	1. Carry out investigation to identify to source/reason of exceedance. Investigation should be completed within 2 weeks; 2. Rectify any unacceptable practice; 3. Implement more mitigation measures if necessary; 4. Inform EPD and operator of STKSTW if exceedance is considered to be caused by the operation of STKSTW.
Limit Level	1. Identify source/reason of exceedance; 2. Inform EPD; 3. Repeat odour patrol to confirm findings; 4. Assess effectiveness of remedial action and keep EPD informed of the results	1. Carry out investigation to identify the source/reason of exceedance. Investigation should be completed within 2 weeks; 2. Rectify any unacceptable practice; 3. Formulate remedial actions; 4. Ensure remedial actions properly implemented; 5. If exceedance continues, consider what more/enhanced mitigation measures should be implemented; 6. Inform EPD and operator of STKSTW if exceedance is considered to be caused by the operation of STKSTW.

4. NOISE

4.1 Introduction

4.1.1 The mitigation measures and general requirements, methodology and equipment for monitoring and audit of construction noise impact associated with the Project are described in this section. According to the EIA, since the predicted operational noise levels at all NSRs are well within the relevant noise criteria, commissioning test and noise monitoring for the TSTP and expanded STKSTW is considered unnecessary during the operation phase.

4.2 Methodology & Criteria

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

4.2.2 Supplementary information for data auditing, statistical results such as L_{10} and L_{90} shall also be obtained for reference. A sample data record sheet is shown in **Annex B** for reference.

Baseline Monitoring

4.2.3 The ET should carry out the baseline noise monitoring prior to the commencement of the major construction works. The baseline noise levels should be measured for a

continuous period of at least 14 consecutive days at a minimum logging interval of 30 minutes during daytime between 0700 and 1900 hours. The Leq, L_{10} and L_{90} should be recorded at the specified intervals. A schedule for the baseline monitoring should be submitted to the IEC for approval before the commencement of baseline monitoring.

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

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

Impact Monitoring

4.2.6 The impact noise monitoring should be carried out at all the designated monitoring stations when there are project-related construction activities undertaken within a radius of 300m from the monitoring stations. Monitoring of $Leq_{(30min)}$ should be carried out at each station at 0700-1900 hours on normal weekdays at a frequency of once a week when construction activities are underway. Any general construction work carried out during restricted hours is controlled by Construction Noise Permit (CNP) under the NCO.

4.2.7 In case of non-compliances with the construction noise criteria, more frequent monitoring as specified in the Event and Action Plan (*Section 4.4*) should be carried out. This additional monitoring should be continued until the recorded noise levels show that the non-compliance is rectified or proved to be irrelevant to the project-related construction activities.

4.3 Monitoring Equipment

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

4.3.2 Noise measurements should not be made in fog, rain, wind with a steady speed exceeding 5 m/s or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

4.3.3 The ET is responsible for the provision of the monitoring equipment to 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.

4.4 Monitoring Locations

4.4.1 According to the environmental findings detailed in the EIA report, the designated locations for the construction noise monitoring are listed in **Table 4.1** and shown in **Figure 4.1**.

Table 4.1 Representative Noise Sensitive Receivers (NSRs) identified for Construction Noise Monitoring

ID	Noise Sensitive Receivers	Description
NM1	NSR 6	Block 45, Sha Tau Kok Chuen
NM2	NSR 8	Building along Shun Lung Street

4.4.2 The status and location of the noise sensitive receivers (NSRs) may change after this EM&A Manual has been issued. In such case, and if changes to the monitoring locations are considered necessary, the ET should propose alternative monitoring locations and seek the agreement from the IEC and EPD on such proposal. When alternative monitoring locations are proposed, they should be chosen based on the following criteria:

(i) The monitoring locations close to the major construction works activities that are likely to have noise impacts;

(ii) The monitoring close to the NSRs as defined in the EIAO-TM; and,

(iii) The assurance of the minimal disturbance and working under a safe condition to the occupants during the monitoring in the vicinity of the NSRs.

4.4.3 The monitoring stations should normally be at a point 1m from the exterior of the facade of the NSR and be at a position 1.2m above ground. If there is a problem with access to the normal monitoring position, an alternative position should be chosen, and a correction to the measurement results should be made. For reference, a correction of +3dB(A) should be made to the free-field measurements. The ETL should agree with the IEC and EPD on the alternative monitoring position and corrections adopted. Once the positions for the monitoring stations are chosen, the baseline and impact monitoring should be carried out at the same positions.

4.5 Event and Action Plan

4.5.1 The action and limit levels for construction noise are defined in **Table 4.2**. If noncompliance occurred, actions as stated in **Table 4.3** should be undertaken.

4.5.2 According to the EIA report, the construction activities would cause noise exceedances at various NSRs and, therefore, appropriate mitigation measures and good site practices are recommended. The Contractor should be responsible for the design and implementation of these measures. The Implementation Schedule of the mitigation measures is included in **Annex A** of this EM&A Manual.

Table 4.2 Action and Limits Level for Construction Noise Impact Monitoring

Time Period	Action Level	Limit Level
Construction Noise		
07:00 – 19:00 hours in normal weekdays	When one documented complaint is received from any one of the noise sensitive receivers	• 75 dB(A) for residential premises • 70 dB(A) for school and • 65 dB(A) during examination period

4.5.3

Table 4.3 Event and Action Plan for Construction Noise Monitoring

Event	Action

	ET	IEC	ER	Contractor
Action Level	1. Carry out investigation to identify the source and cause of the complaint/ exceedance(s) 2. Notify IEC, ER, and Contractor and report the results of investigation to the Contractor, ER and the IEC 3. Discuss with the Contractor and IEC for remedial measures required 4. If the complaint is related to the Project, conduct additional monitoring for checking mitigation effectiveness and report the findings and results to the IEC, ER and the Contractor	1. Review the analyzed results submitted by the ET 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly 3. Supervise the implementation of remedial measures	1. Confirm receipt of Notification of Exceedance in writing 2. Require Contractor to propose remedial measures for the analysed noise problem 3. Ensure remedial measures are properly implemented	1. Submit noise mitigation proposals, if required, to the IEC and ER 2. Implement noise mitigation proposals.
Limit Level	1. Carry out investigation to identify the source and cause of the exceedance 2. Notify IEC, ER, Project Proponent, EPD and Contractor 3. Repeat measurements to confirm findings 4. Provide investigation report to IEC, ER, EPD and Contractor he causes of the exceedances 5. If the exceedance is related to the Project, assess effectiveness by additional monitoring. 6. Report the remedial action implemented and the additional monitoring results to IEC, EPD, ER and Contractor 7. If exceedance stops, cease additional monitoring	1. Review the analyzed results submitted by the ET 2. Discuss the potential remedial measures with ER, ET Leader and Contractor 3. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly 4. Supervise the implementation of remedial measures	1. Confirm receipt of Notification of Exceedance in writing 2. Require the Contractor to propose remedial measures for the analysed noise problem 3. Ensure remedial measures are properly implemented 4. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor, in agreement with the Project Proponent, to stop that activity of work until the exceedance is abated	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IEC and ER within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant activity of works as determined by the Project Proponent until the exceedance is abated

Notes:
ET – Environmental Team, IEC – Independent Environmental Checker; ER = Engineering Representatives

5. WATER QUALITY

5.1 Introduction

5.1.1 In accordance with the recommendations of the EIA, water quality EM&A is required during the installation, maintenance and removal of sheetpiles and sediment removal works for construction of diffuser and, during operation of the TSTP and expanded STKSTW. In addition, baseline water quality monitoring will be required prior to the

commencement of marine construction activities. The following Section provides details of the water quality monitoring to be undertaken by the Environmental Team (ET) to verify the distance of sediment and effluent plume dispersion and to identify whether the potential exists for any indirect impacts to occur to ecological sensitive receivers. The water quality monitoring programme will be carried out to allow any deteriorating water quality to be readily detected and timely action taken to rectify the situation. The status and locations of water quality sensitive receivers and the marine works location may change after issuing this Document. If required, the ET in consultation with IEC will propose updated monitoring locations and seek approval from EPD.

5.1.2 Water quality monitoring for the Project can be divided into the following stages:

- Installation, maintenance and removal of sheetpiles and sediment removal works for construction of diffuser during marine construction works;
- Continuous monitoring of treated sewage effluent from the TSTP;
- Marine water quality monitoring during the first year of the TSTP operation;
- Continuous monitoring of treated sewage effluent from the expanded STKSTW;
- Marine water quality monitoring during the first year of the phase 1 of expanded STKSTW operation;
- Marine water quality monitoring during the first year of the phase 2 of expanded STKSTW operation; and
- Follow-up water quality monitoring after any emergency discharge event at any stage.

5.2 Sampling & Testing Methodology

Water Quality Parameters

5.2.1 The parameters that have been selected for measurement *in situ* and in the laboratory are those that were either determined in the EIA to be those with the most potential to be affected by the construction works or are a standard check on water quality conditions. Parameters to be measured in the construction phase, operation phase a, emergency discharge and effluent quality monitoring are listed in **Table 5.1**.

Table 5.1 Parameters measured in the marine water quality monitoring

Parameters	Unit	Abbre.	Remarks						
			Baseline	Construction	TSTP		Expanded STKSTW		Emergency Discharge at Any Stage
					Marine WQ Monitoring	Effluent Monitoring	Marine WQ Monitoring (Phase 1&2)	Effluent Monitoring (Phase 1&2)	
In situ measurements									
Dissolved oxygen	mg/L	DO	✓	✓	✓	✓	✓	✓	✓
Temperature	°C	-	✓	✓	✓	✓	✓	✓	✓
pH	-	-	✓	✓	✓	✓	✓	✓	✓
Turbidity	NTU	-	✓	✓	✓	✓	✓	✓	✓
Salinity	‰	-	✓	✓	✓	✓	✓	✓	✓
Laboratory measurements									
Suspended Solids	mg/L	SS	✓	✓	✓	✓	✓	✓	✓
Biochemical Oxygen Demand	mg/L	BOD5	✓		✓	✓	✓	✓	✓
Total Phosphorus	mg/L	BOD5	✓		✓	✓	✓	✓	✓

Parameters	Unit	Abbre.	Remarks					
Total Nitrogen	mg/L	BOD5	✓	✓	✓	✓	✓	✓
Ammonia Nitrogen	mg/L	BOD5	✓	✓	✓	✓	✓	✓
Total Inorganic Nitrogen	mg/L	TIN	✓	✓	✓	✓	✓	✓
E.coli	CFU/100 mL		✓	✓	✓	✓	✓	✓

*Note: Monitoring of TRC will be conducted when cleaning and sterilization of the new freshwater main is carried out.

5.2.2 In addition to the water quality parameters, other relevant data will also be measured and recorded in Water Quality Monitoring Logs, including the location of the sampling stations, water depth, time, weather conditions, sea conditions, tidal stage, current direction and velocity, special phenomena and work activities undertaken around the monitoring and works area that may influence the monitoring results. A sample data record sheet is shown in **Annex B** for reference.

Monitoring Equipment

5.2.3 For water quality monitoring, the following equipment will be used:

Dissolved Oxygen and Temperature Measuring Equipment - The instrument will be a portable, weatherproof dissolved oxygen measuring instrument complete with cable, sensor, comprehensive operation manuals, and will be operable from a DC power source. It will be capable of measuring: dissolved oxygen levels in the range of 0 - 20 mg L-1 and 0 - 200% saturation; and a temperature of 0 - 45 degrees Celsius. It shall have a membrane electrode with automatic temperature compensation complete with a cable of not less than 35 m in length. Sufficient stocks of spare electrodes and cables shall be available for replacement where necessary (e.g. YSI model 59 DO meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

Turbidity Measurement Equipment - The instrument will be a portable, weatherproof turbidity-measuring unit complete with cable, sensor and comprehensive operation manuals. The equipment will be operated from a DC power source, it will have a photoelectric sensor capable of measuring turbidity between 0 - 1000 NTU and will be complete with a cable with at least 35 m in length (for example Hach 2100P or an approved similar instrument).

Salinity Measurement Instrument - A portable salinometer capable of measuring salinity in the range of 0 - 40 ppt will be provided for measuring salinity of the water at each monitoring location.

Water Depth Gauge – A portable, battery-operated echo sounder (for example Seafarer 700 or a similar approved instrument) will be used for the determination of water depth at each designated monitoring station. This unit will preferably be affixed to the bottom of the work boat if the same vessel is to be used throughout the monitoring programme. The echo sounder should be suitably calibrated. The ET shall seek approval for their proposed equipment with the client prior to deployment.

Current Velocity and Direction – No specific equipment is recommended for measuring the current velocity and direction. The environmental contractor shall seek approval of their proposed equipment with the client prior to deployment.

Positioning Device – A Global Positioning System (GPS) shall be used during monitoring to allow accurate recording of the position of the monitoring vessel

before taking measurements. The Differential GPS, or equivalent instrument, should be suitably calibrated at appropriate checkpoint (e.g. Quarry Bay Survey Nail) to verify that the monitoring station is at the correct position before the water quality monitoring commence.

Water Sampling Equipment - A water sampler, consisting of a PVC or glass cylinder of not less than two litres, which can be effectively sealed with cups at both ends, will be used (e.g. Kahlsico Water Sampler 13SWB203 or an approved similar instrument). The water sampler will have a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler is at the selected water depth.

Sampling / Testing Protocols

5.2.4 All *in situ* monitoring instruments will be checked, calibrated and certified by a laboratory accredited under HOKLAS (1) or any other international accreditation scheme before use, and subsequently re-calibrated at monthly intervals throughout the stages of the water quality monitoring. Responses of sensors and electrodes will be checked with certified standard solutions before each use.

5.2.5 On-site calibration of field equipment shall follow the "*Guide to On-Site Test Methods for the Analysis of Waters*", BS 1427: 2009. Sufficient stocks of spare parts shall be maintained for replacements when necessary. Backup monitoring equipment shall also be made available so that monitoring can proceed uninterrupted even when equipment is under maintenance, calibration etc.

Laboratory Measurement and Analysis

5.2.6 All laboratory work shall be carried out in a HOKLAS accredited laboratory (1). Sufficient volume of each water sample shall be collected at the monitoring stations for carrying out the laboratory analyses. Using chain of custody forms, collected water samples will be transferred to an HOKLAS accredited laboratory for immediate processing. The determination work shall start within the next working day after collection of the water samples. The laboratory measurements shall be provided to the client within 5 working days of the sampling event. Analytical methodology and sample preservation of other parameters will be based on the latest edition of *Standard Methods for the Examination of Waste and Wastewater* published by APHA, AWWA and WPCF and methods by USEPA, or suitable method in accordance with requirements of HOKLAS or another internationally accredited scheme. The submitted information should include pre-treatment procedures, instrument use, Quality Assurance/Quality Control (QA/QC) details (such as blank, spike recovery, number of duplicate samples per-batch etc), detection limits and accuracy. The QA/QC details shall be in accordance with requirements of HOKLAS or another internationally accredited scheme.

5.2.7 Parameters for laboratory measurements, their standard methods and their detection limits are presented in **Table 5.2**.

Table 5.2 Laboratory measurements, standard methods and corresponding detection limits of marine water quality monitoring

Parameters	Standard Methods	Reporting Limit	Precision
Construction Phase			

(1) The laboratory will be contracted before commencement of the monitoring programme.

Parameters	Standard Methods	Reporting Limit	Precision
Dissolved oxygen (mg/L)	Instrumental, CTD	0.1	±25%
Temperature (°C)	Instrumental, CTD	0.1	±25%
pH	Instrumental, CTD	0.1	±25%
Turbidity (NTU)	Instrumental, CTD	0.1	±25%
Salinity ($^0/_{00}$)	Instrumental, CTD	0.1	±25%
Suspended Solids (mg/L)	APHA 2540E	1.0	-
Marine Water Quality Monitoring for Operation of the TSTP and the Expanded STKSTW			
Dissolved oxygen (mg/L)	Instrumental, CTD	0.1	±25%
pH	Instrumental, CTD	0.1	-
Turbidity (NTU)	Instrumental, CTD	0.1	±25%
Salinity ($^0/_{00}$)	Instrumental, CTD	0.1	±25%
Suspended Solids (mg/L)	APHA 2540E	1.0	-
Biochemical Oxygen Demand (mg/L))	APHA 19ed 5210B	1.0	-
Total Phosphorus (mg/L))	APHA 19ed 4500-P.B.E	0.01	-
Total Nitrogen (mg/L))	APHA 19ed 4500-Norg APHA 19ed 4500-NH_3 F APHA 19ed 4500-NO_2- B APHA 19ed 4500-NO_3- E	0.05	-
Ammonia Nitrogen (mg/L))	APHA 19ed 4500-NH_3 F	0.02	-
Total Inorganic Nitrogen	APHA 19ed 4500-NH_3 F APHA 19ed 4500-NO_2- B APHA 19ed 4500-NO_3- E	0.05	-
E.coli	EPD HKSAR, Wat. Sci. Tech. Vol.35, No. 11-12, pp 409-413	1 CFU per 100 ml	-

*Note: The testing methods, Quality Assurance/Quality Control 9QA/QC) details, detection limits and accuracy shall be submitted to EPD for approval prior to the commencement of monitoring programme.

Monitoring Locations

5.2.8 The water quality monitoring locations for baseline, construction and marine water quality monitoring during the first year of the TSTP operation and expanded STKSTW operation as well as emergency discharge are shown in **Figure 5.1** and detailed in **Table 5.3** below. A schedule for water quality monitoring shall be prepared by the ET and approved by IEC and EPD prior to the commencement of the monitoring.

Table 5.3 Location of Water Quality Monitoring Stations

Station	Easting	Northing	Description	Remarks					
				Baseline	Construction	First-year Operation of TSTP	First-year Operation of Expanded STKSTW (Phase 1)	First-year Operation of Expanded STKSTW (Phase 2)	Emergency Discharge at Any Stage
FCZ1A*	840892	844241	Sha Tau Kok Fish Culture Zone – East	✓	✓		✓	✓	✓
FCZ1B*	841565	844299	Sha Tau Kok Fish Culture Zone – West	✓		✓			
FCZ2	845701	845691	Ap Chau Fish Culture Zone	✓			✓	✓	✓
FCZ7*	842282	844451	Temporary Relocation Site for Fish Rafts of the Sha Tau Kok Fish Culture Zone	✓	✓	✓	✓	✓	✓
FCZ8*	841511	843959	Temporary Relocation Site for Fish Rafts of the Sha Tau Kok Fish Culture Zone	✓	✓	✓	✓	✓	✓

Station	Easting	Northing	Description	Remarks					
SG	841099	844650	Seagrass Colony	✓	✓	✓	✓	✓	✓
M1	840647	844860	Mangrove Stand	✓	✓	✓			
M6	843220	845130	Mangrove Stand	✓			✓	✓	✓
H1	840395	844653	Horseshoe Crab	✓	✓	✓			
H4 ^	839664	842925	Horseshoe Crab	✓	✓	✓	✓	✓	✓
N1	842863	845378	Impact Station of the Expanded STKSTW (Ebb Tide)	✓	✓	✓	✓	✓	✓
N2	842109	844631	Impact Station of the Expanded STKSTW (Flood Tide)	✓	✓	✓	✓	✓	✓
C	844690	845886	Control Station	✓	✓	✓	✓	✓	✓

* FCZ7 and FCZ8 are the potential relocation zones for FCZ1A and FCZ1B (Sha Tau Kok Fish Culture Zone) when there is sediment dredging at Sha Tau Kok Fish Culture Zone, Approach Channel, Boat Shelter, etc. Monitoring at FCZ7 and / or FCZ8 would only be required when there is mariculture activities within the relocation zones.
^ H4 is located in very shallow mudflat area and may be emersed completely in low tide. The ET should assess the accessibility of the site and other constraints, and adjust the location of this station before the commencement of the baseline survey if necessary.

5.2.9 Effluent from the TSTP and expanded STKSTW shall be collected at a suitable location after all treatment process before discharge. The sampling location should be agreed with DSD and EPD, and should fulfil the following requirements:

- Effluent collected at the sampling location is representative to the effluent discharged at the outfall
- Sampling works at the sampling location would not interfere with the sewage treatment works operation
- Sampling works at the sampling location would not induce safety hazard (e.g. staff sampling effluent drops into the culvert)

5.2.10 The status and locations of water quality sensitive receivers and the monitoring sites may change after issuing this Manual. If such cases exist, the ET shall propose updated monitoring locations and seek approval from the ER, the IEC, and the IEC.

5.2.11 When alternative monitoring locations are proposed, they shall be chosen based on the following criteria:

- at locations close to and preferably at the boundary of the site activities as indicated in the EIA report, which are likely to have water quality impacts;
- close to the sensitive receptors which are directly or likely to be affected;
- for monitoring locations located in the vicinity of the sensitive receptors, care should be taken to cause minimal disturbance during monitoring; and
- reference stations which are at locations representative of the project site in its undisturbed condition.

Sampling Frequency

Baseline Monitoring

5.2.12 Baseline conditions for water quality shall be established and agreed with the IEC and the EPD prior to the commencement of works. The purpose of the baseline

monitoring is to establish ambient conditions prior to the commencement of the works and to demonstrate the suitability of the proposed impact and control monitoring stations. The baseline conditions shall normally be established by measuring the water quality parameters specified above.

5.2.13 The measurements shall be taken at all designated monitoring stations including control stations, once per day for a minimum of 3 days per week for 4 weeks prior to the commencement of the construction works. Measurements shall be taken at each station at any time. The interval between two sets of monitoring shall not be less than 36 hours.

5.2.14 No construction activities shall be on-going in the vicinity of the stations during the baseline monitoring. The ET shall be responsible for undertaking the baseline monitoring and submitting the results within 10 working days from the completion of the baseline monitoring work.

5.2.15 In exceptional cases when insufficient baseline monitoring data or questionable results are obtained, the ET shall seek approval from the IEC and the EPD on an appropriate set of data to be used as baseline reference.

5.2.16 The baseline monitoring schedule shall be issued to the IEC and EPD at least 1 week prior to the commencement of baseline monitoring.

Construction Phase

5.2.17 During periods when there are sheetpiles installation, maintenance and removal works and sediment removal works, impact monitoring should be undertaken at the specified monitoring stations as shown in **Figure 5.1** and **Tables 5.3** three times a week. Monitoring at each station would be undertaken at both mid-ebb and mid-flood tides on the same day. The tidal range selected for the baseline monitoring will be at least 0.5 m for both flood and ebb tides as far as practicable. The interval between two sets of monitoring would not be less than 36 hours. The monitoring frequency would be increased in the case of exceedances of Action/Limit Levels if considered necessary by ET. Monitoring frequency would be maintained as far as practicable.

5.2.18 The monitoring location/position, time, water depth, water temperature, salinity, weather conditions, sea conditions, tidal stage, special phenomena and work underway at the marine works site will be recorded.

First-year Operation Phase

5.2.19 Upon commencement of the TSTP, Phase 1 and Phase 2 Expansion of the expanded STKSTW, an operation phase water quality monitoring exercise would be carried out for a minimum of 3 days per week for one-year, in the same manner as the baseline monitoring.

Continuous Effluent Quality Monitoring for First Year Operation of the TSTP and Expanded STKSTW

5.2.20 The effluent of the TSTP, Phase 1 and Phase 2 Expansion should be collected in a full 24-hour period. Twenty four-hour flow-weighted composite effluent sample for subsequent chemical analysis and testing should be prepared by the following procedures:

- Collect effluent sub-sample at bi-hourly interval over a 24 hour period
- Obtain flow record of the Project for the 24-hour sampling period
- Calculate the volume of each sub-sample for preparation of flow-weighted composite sample

- Transfer the appropriate volume of sub-samples to a clean container and mix thoroughly

5.2.21 The results of effluent quality monitoring shall be compared against the Action and Limit Levels stipulated in **Table 5.4**. The monitoring requirement for the continuous effluent quality monitoring should be approved by EPD. In case of non-compliance, suitable actions shall be undertaken to notify the plant operator for the non-compliance and identify the cause for the non-compliance. Corrective and remedial actions shall be implemented to improve the effluent quality. The monitoring frequency should also be increased until the effluent quality is in compliance with the stipulated levels. The non-compliance events and preventive measures shall be documented.

Emergency Discharge Follow-up Monitoring Exercise

5.2.22 After an emergency discharge event from the TSTP or the expanded STKSTW, a follow-up water quality monitoring exercise shall be commenced within 24 hours after the start of the emergency discharge at all stations shown in **Figure 5.1** and **Tables 5.3**. The monitoring shall be conducted by DSD or other agent appointed by the DSD. The result of the monitoring each day shall be compared with the Action and Limit Levels stipulated in **Table 5.4**. In case of non-compliance, the monitoring exercise shall be repeated on the next day until no further exceedance of the Action and Limit Levels at all monitoring stations is recorded for 2 consecutive days.

Sampling Depths & Replication

5.2.23 For baseline, construction phase and operation phase monitoring, each station will be sampled and measurements/ water samples will be taken at three depths, 1 m below the sea surface, mid-depth and 1 m above the seabed. For stations that are less than 3 m in depth, only the mid depth sample shall be taken. For stations that are less than 6 m in depth, only the surface and seabed sample shall be taken. For in situ measurements, duplicate readings shall be made at each water depth at each station. Duplicate water samples shall be collected at each water depth at each station. Monitoring stations for coastal marine ecology such as M1, M6, H1, H2 and SG is located at shallow water. Caution should be taken for field measurement and sampling at these monitoring stations to avoid disturbance of bottom sediment by vessel or human (when wading) movement.

5.2.24 The effluent sampling should be planned carefully to ensure appropriate volume of effluent sub-samples is collected to prepare sufficient amount of flow-weighted composite effluent sample for carrying out subsequent chemical analysis and testing.

5.3 Water Quality Compliance

5.3.1 Water quality monitoring will be evaluated against Action and Limit Levels. The key assessment parameters are dissolved oxygen and suspended sediment and thus Action and Limit Levels based on the assessment criteria are identified for these. However turbidity can also provide valuable instantaneous information on water quality and thus Action and Limit Levels are also recommended for this parameter to facilitate quick responsive action in the event of any apparent unacceptable deterioration attributable to the works. The proposed Action and Limit Levels are shown in **Table 5.4**.

5.3.2 Action and Limit levels are used to determine whether operational modifications are necessary to mitigate impacts to water quality. In the event that the levels are exceeded for construction phase or marine water monitoring for first-year operation of TSTP and expanded STKSTW, appropriate actions in Event and Action Plan (**Table**

5.5*)* should be undertaken and a review of works will be carried out by the Contractor(s). The effluent quality for the operation of TSTP is chosen in a way that no increase in pollution loading would be resulted from the potential increase of average flow from 1,660 m^3/day of the existing STKSTW to 2,500 m^3/day. Since the increase of average flow is about 50%, a reduction of effluent concentration by one-third would be required to ensure no increase in pollution loading due to the operation of the TSTP as stated in the EIA.

5.3.3 During a follow-up water quality monitoring exercise after an emergency discharge event, DSD or its appointed agent shall inform the mariculturists, relevant stakeholders (e.g. Sha Tau Kok District Rural Committee) and relevant government departments (e.g. AFCD, EPD, MD) everyday on the latest results of the water quality monitoring exercise to allow these parties to make informed decisions. By the end of the follow-up water quality monitoring exercise, DSD or its appointed agent shall also inform these parties that no exceedance of the Action and Limit Levels has been recorded at all WSRs for two consecutive days to signal the recovery of water quality.

5.3.4 Any noticeable change to water quality will be recorded in the monitoring reports and will be investigated and remedial actions will be undertaken to reduce impacts. Particular attention will be paid to the Contractor(s)'s implementation of the recommended mitigation measures.

Table 5.4 Action and Limit Level for Water Quality

Parameter	Action Level	Limit Level
Construction Phase Marine Water Monitoring		
DO in mg/L [b]	Surface and Middle 5%-ile of baseline data for surface and middle layer Bottom 5%-ile of baseline data for bottom layers Fish Culture Zones 5.1 mgL^{-1} or level at control station (whichever the lower)	Surface and Middle 4 mg L^{-1} or 1%-ile of baseline data for surface and middle layer Bottom 2 mg L^{-1} or 1%-ile of baseline data for bottom layer Fish Culture Zones 5.0 mgL^{-1} or level at control station (whichever the lower)
Turbidity (Tby) in NTU (Depth-averaged [a]) [c]	95%-ile of baseline data, **or** 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, **or** 30% exceedance of value at any impact station compared with corresponding data from control station
SS in mg/L (Depth-averaged [a]) [c]	95%-ile of baseline data, **or** 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, **or** 30% exceedance of value at any impact station compared with corresponding data from control station
Marine Water Monitoring for First-year Operation of TSTP and Expanded STKSTW as well as Follow-up Monitoring for Emergency Discharge		

Parameter	Action Level	Limit Level
Dissolved oxygen in mg/L [b]	Surface and Middle 5%-ile of baseline data for surface and middle layer Bottom 5%-ile of baseline data for bottom layers Fish Culture Zones 5.1 mgL^{-1} or level at control station (whichever the lower)	Surface and Middle 4 mg L^{-1} for surface and middle layer or 1%-ile of baseline data for surface and middle layer Bottom 2 mg L^{-1} for bottom layers or 1%-ile of baseline data for bottom layer Fish Culture Zones 5.0 mgL^{-1} or level at control station (whichever the lower)
Turbidity in NTU (Depth-averaged [a]) [c]	95%-ile of baseline data, **or** 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, **or** 30% exceedance of value at any impact station compared with corresponding data from control station
Salinity in PSU (Depth-averaged [a]) [c]	Below 91% of baseline level or 9% less than value at any impact station compared with corresponding data from control station	Below 90% of baseline level or 10% less than value at any impact station compared with corresponding data from control station
SS in mg/L (Depth-averaged [a]) [c]	95%-ile of baseline data, **or** 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, **or** 30% exceedance of value at any impact station compared with corresponding data from control station
Biochemical Oxygen Demand in mg/L (Depth-averaged [a])	95%-ile of baseline data, **or** 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, **or** 30% exceedance of value at any impact station compared with corresponding data from control station
Total Phosphorus in mg/L (Depth-averaged [a])	95%-ile of baseline data, **or** 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, **or** 30% exceedance of value at any impact station compared with corresponding data from control station
Total Nitrogen in mg/L (Depth-averaged [a])	95%-ile of baseline data, **or** 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, **or** 30% exceedance of value at any impact station compared with corresponding data from control station
Ammonia Nitrogen in mg/L (Depth-averaged [a])	95%-ile of baseline data, **or** 20% exceedance of value at any impact station compared with corresponding data from control station	99%-ile of baseline data, **or** 30% exceedance of value at any impact station compared with corresponding data from control station
TIN in mg/L (Depth-averaged [a]) [c]	0.29 mg/L **or** 95%-ile of baseline level	0.30 mg/L **or** 99%-ile of baseline level
E.coli CFU/100 mL (Depth-averaged [a]) [c]	600 for fish culture zones **or** 95%-ile of baseline level	610 for fish culture zones **or** 99%-ile of baseline level

Notes:

a. "Depth-averaged" is calculated by taking the arithmetic means of reading of all three depths.

b. For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limits.

c. For SS, turbidity, salinity, TIN and *E.coli*, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

Parameter	Action Level	Limit Level
Continuous Effluent Quality Monitoring for First Year Operation of the TSTP and Expanded STKSTW (Phase 1 & 2)		
SS in mg/L	TSTP 20 mg/L Expanded STKSTW (Stage 1) 30 mg/L Expanded STKSTW (Stage 2) 30 mg/L	TSTP 40 mg/L Expanded STKSTW (Stage 1) 60 mg/L Expanded STKSTW (Stage 2) 60 mg/L
Biochemical Oxygen Demand in mg/L	TSTP 13.3 mg/L Expanded STKSTW (Stage 1) 20 mg/L Expanded STKSTW (Stage 2) 20 mg/L	TSTP 26.6 mg/L Expanded STKSTW (Stage 1) 40 mg/L Expanded STKSTW (Stage 2) 40 mg/L
Total Nitrogen in mg/L	TSTP 28.6 mg/L Expanded STKSTW (Stage 1) 12 mg/L Expanded STKSTW (Stage 2) 12 mg/L	TSTP 57.1 mg/L Expanded STKSTW (Stage 1) 24 mg/L Expanded STKSTW (Stage 2) 24 mg/L
Total Phosphorus in mg/L	TSTP 3.3 mg/L Expanded STKSTW (Stage 1) 4 mg/L Expanded STKSTW (Stage 2) 4 mg/L	TSTP 6.6 mg/L Expanded STKSTW (Stage 1) 8 mg/L Expanded STKSTW (Stage 2) 8 mg/L
E.coli CFU/100 mL	TSTP 664 cfu/100ml Expanded STKSTW (Stage 1) 1,000 cfu/100ml Expanded STKSTW (Stage 2) 1,000 cfu/100ml	TSTP 996 cfu/100ml Expanded STKSTW (Stage 1) 1,500 cfu/100ml Expanded STKSTW (Stage 2) 1,500 cfu/100ml

Table 5.5 Event and Action Plan for Water Quality Monitoring

Event	Action			
	ET	**IEC**	**Contractor(s)**	**ER**
Action Level being exceeded by one sampling day	1. Repeat *in situ* measurement on the next day of exceedance to confirm findings; 2. Check monitoring data, plant, equipment and Contractor(s)'s working methods; 3. Identify source(s) of impact and record in notification of exceedance; 4. Inform IEC, Contractor(s) and ER.	1. Check monitoring data submitted by ET and Contractor(s)'s working methods; 2. Inform EPD and AFCD.	1. Confirm receipt of notification of exceedance in writing; 2. Check plant and equipment and rectify unacceptable practice	1. Confirm receipt of notification of exceedance in writing.
Action Level being exceeded by two or more consecutive sampling days	1. Repeat *in situ* measurement on the next day of exceedance to confirm findings; 2. Check monitoring data, plant, equipment and Contractor(s)'s working methods; 3. Identify source(s) of impact and record in notification of exceedance; 4. Inform IEC, Contractor(s) and ER; 5. Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented	1. Check monitoring data submitted by ET and Contractor(s)'s working methods; 2. Inform EPD and AFCD; 3. Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; 4. Assess the effectiveness of the implemented mitigation measures.	1. Confirm receipt of notification of exceedance in writing; 2. Check plant and equipment and rectify unacceptable practice; 3. Consider changes of working methods; 4. Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; 5. Implement the agreed mitigation measures.	1. Confirm receipt of notification of exceedance in writing; 2. Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented. 3. Ensure additional mitigation measures are properly implemented.

Event	Action			
	ET	**IEC**	**Contractor(s)**	**ER**
Limit Level being exceeded by one sampling day	1. Repeat *in situ* measurement on the next day of exceedance to confirm findings; 2. Check monitoring data, plant, equipment and Contractor(s)'s working methods; 3. Identify source(s) of impact and record in notification of exceedance; 4. Inform IEC, Contractor(s) and ER; 5. Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented	1. Check monitoring data submitted by ET and Contractor(s)'s working methods; 2. Inform EPD and AFCD; 3. Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; 4. Assess the effectiveness of the implemented mitigation measures.	1. Confirm receipt of notification of exceedance in writing; 2. Check plant and equipment and rectify unacceptable practice; 3. Critically review the need to change working methods; 4. Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; 5. Implement the agreed mitigation measures.	1. Confirm receipt of notification of exceedance in writing; 2. Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented. 3. Ensure additional mitigation measures are properly implemented. 4. Request Contractor(s) to critically review the working methods.
Limit Level being exceeded by two or more consecutive sampling days	1. Repeat *in situ* measurement on the next day of exceedance to confirm findings; 2. Check monitoring data, plant, equipment and Contractor(s)'s working methods; 3. Identify source(s) of impact and record in notification of exceedance; 4. Inform IEC, Contractor(s) and ER; 5. Discuss with IEC and Contractor(s) on additional mitigation measures and ensure that they are implemented	1. Check monitoring data submitted by ET and Contractor(s)'s working methods; 2. Inform EPD and AFCD; 3. Discuss with ET and Contractor(s) on additional mitigation measures and advise ER accordingly; 4. Assess the effectiveness of the implemented mitigation measures.	1. Confirm receipt of notification of exceedance in writing; 2. Check plant and equipment and rectify unacceptable practice; 3. Critically review the need to change working methods; 4. Discuss with ET and IEC on additional mitigation measures and propose them to ER within 3 working days; 5. Implement the agreed mitigation measures.	1. Confirm receipt of notification of exceedance in writing; 2. Discuss with the IEC on the proposed additional mitigation measures and agree on the mitigation measures to be implemented. 3. Ensure additional mitigation measures are properly implemented. 4. Request Contractor(s) to critically review the working methods.

Notes : ET – Environmental Team, IEC – Independent Environmental Checker; ER = Engineering Representatives
The above actions should be taken within 1 working day after the exceedance is identified during operation phase.

6. WASTE MANAGEMENT

6.1 Introduction

6.1.1 The construction of the Project is expected to generate the following types of waste:

- Site clearance/demolition materials;
- Excavated materials;
- Sediment;
- Bentonite slurry;
- Chemical waste; and
- General refuse.

6.1.2 The operation of the Project will also generate the following types of waste:

- Sludge;
- Solid waste; and
- Chemical waste.

6.1.3 Mitigation measures, where appropriate, have been recommended as part of the EIA to avoid or reduce potential adverse environmental impacts associated with handling, collection and disposal of waste arising from the construction of the proposed Project.

6.1.4 Waste management will be the Contractor(s)'s responsibility and wastes produced during the construction phase will be managed in accordance with appropriate waste management practices and EPD's regulations and requirements.

6.1.5 Auditing of waste management practices during regular site inspections will confirm that thewaste generated during construction are properly, stored, handled and disposed of. The construction Contractor(s) will be responsible for the implementation of any mitigation measures to reduce waste or redress issues arising from the waste materials.

6.2 Waste Management Practices

6.2.1 The waste management practices and recommended mitigation measures will be incorporated into a Environmental Management Plan (EMP) as stated in the "ETWB TC(W) No. 19/2005, Environmental Management on Construction Sites" for managing the different types of wastes by the Contractors on site. The EMP will be certified by the ET Leader and verified by the IEC as conforming to the information and recommendations contained in the EIA Report.

6.2.2 The EMP shall describe the arrangements for avoidance, reuse, recovery and recycling, storage, collection, treatment, the estimated rate of construction and demolition materials generation and disposal, and the recommended mitigation measures on waste management as set out in **Section 6.6** of the EIA Report. The EMP shall indicate the disposal arrangements and locations of C&D materials and other wastes.

6.2.3 A Trip Ticket system will be included in the EMP. Surplus excavated spoil and other wastes will not be disposed at any other designated disposal locations unless otherwise approved in writing by EPD, Secretary of Public Fill Committee and/or other authorities as appropriate.

6.2.4 The Implementation Schedule (**Annex A**) provides details on the appropriate mitigation measures for avoiding and preventing adverse environmental impacts associated with sediment, C&D materials, chemical wastes, general refuse and

sewage from the workforce. The EMP will be refined and updated as more detailed information is generated on the volume of sediment and the agreed disposal arrangements. Similarly, it will be regularly reviewed, and updated as appropriate, throughout the course of the construction works to confirm that it remains current with the latest detailed information and works practices.

6.2.5 The EMP will also outline the requirements for a waste audit program to verify that the measures outlined in the plan are effectively implemented and adhered too.

6.3 Methodology and Criteria

6.3.1 The construction Contractor(s) must confirm that the necessary disposal permits or licences are obtained from appropriate authorities in accordance with the various Ordinances. In addition to the monthly joint inspections/ audits, each construction Contractor(s) will designate a member of staff as being responsible for routine inspections and audits of on-site waste management practices, with reference to the relevant legislation and guidelines as well as the recommendations given in the Implementation Schedule contained in **Annex A** of this Manual, and defined below:

(i) General Legislation

- Waste Disposal Ordinance (WDO) (Cap 354);
- Waste Disposal (Chemical Waste) (General) Regulation (Cap 354C);
- Waste Disposal (Charges for Disposal of Construction Waste) Regulation (Cap 354N);
- Land (Miscellaneous Provisions) Ordinance (Cap 28);
- Public Health and Municipal Services Ordinance (Cap 132) – Public Cleansing and Prevention of Nuisances Regulations; and
- Dumping at Sea Ordinance (DASO) (Cap. 466).

(ii) Other Relevant Guidelines

- Waste Disposal Plan for Hong Kong (December 1989), Planning, Environment and Lands Branch Government Secretariat, Hong Kong SAR Government;
- Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes (1992), EPD, Hong Kong SAR Government;
- Hong Kong Planning Standards and Guidelines Planning (2015), Planning Department, Hong Kong SAR Government;
- WBTC No. 2/93 - Public Dumps, Works Branch, Hong Kong SAR Government;
- WBTC No. 2/93B - Public Filling Facilities, Works Branch, Hong Kong SAR Government;
- WBTC No. 16/96 - Wet Soil in Public Dumps, Works Branch, Hong Kong SAR Government;
- Waste Reduction Framework Plan, 1998 to 2007, Planning, Environment and Lands Bureau, Government Secretariat, 5 November 1998;
- WBTC No. 4/98 and 4/98A - Use of Public Fill in Reclamation and Earth Filling Projects, Works Bureau, Hong Kong SAR Government;
- WBTC No. 12/2000 - Fill Management, Works Bureau, Hong Kong SAR Government;

- WBTC No. 19/2001 - Metallic Site Hoardings and Signboards; Works Bureau, Hong Kong SAR Government;
- WBTC No. 12/2002 - Specifications Facilitating the Use of Recycled Aggregates, Works Bureau, Hong Kong SAR Government;
- ETWB TCW No. 24/2004 - Specifications Facilitating the Use of Concrete Paving Units Made of Recycled Aggregates
- ETWB TC(W) No. 34/2002 - Management of Dredged/ Excavated Sediment, Environment, Transport and Works Bureau, Hong Kong SAR Government;
- ETWB TC(W) No. 19/2005 - Environmental Management on Construction Sites, Environment, Transport and Works Bureau, Hong Kong SAR Government;
- DEVB TC(W) No. 6/2010 - Trip Ticket System for Disposal of Construction & Demolition Materials, Development Bureau, Hong Kong SAR Government; DEVB TCW No. 8/2010 - Enhanced Specification for Site Cleanliness and Tidiness;
- DEVB TCW No. 2/2011 – Encouraging the Use of Recycled and other Green Materials on Public Works Projects;
- DEVB TCW No. 9/2011 – Enhanced Control Measures for Management of Public Fill; and
- Project Administration Handbook for Civil Engineering Works (2014 Edition) – section 4.1.3 relating to Construction and Demolition Materials

6.3.2 The Contractor(s)'s waste management practices will be audited with reference to the checklist detailed in **Table 6.1** below.

6.3.3 Details of the required mitigation measures are included in the Implementation Schedule of **Annex A** of this EM&A Manual.

Table 6.1 Waste Management Checklist

Activities	Timing	Checking	If non-compliance noted, Action Required
Necessary waste disposal permits or licences have been obtained	Before the commencement of works	Once	The ET will inform the Contractor(s), IEC and ER. The Contractor(s) will apply for the necessary permits/ licences prior to disposal of the waste. The ET will verify that corrective action has been taken.
Excavated sediments are managed and disposed in accordance with ETWB TC(W) No. 34/2002: Management Framework for Disposal of Dredged/ Excavated Sediment .	Throughout the sediment excavation works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will instruct the Contractor(s) to manage and dispose the excavated materials properly. The Contractor(s) will immediately suspend excavation until the excavated materials are properly managed and disposed.
Only licensed waste collectors are used for waste collection.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will

Activities	Timing	Checking	If non-compliance noted, Action Required
			instruct the Contractor(s) to use a licensed waste collector. The Contractor(s) will temporarily suspend waste collection of that particular waste until a licensed waste collector is used. Corrective action will be undertaken within 48 hours.
Records of quantities of wastes generated, recycled and disposed are properly kept. For demolition material/waste, the number of loads for each day will be recorded (quantity of waste can then be estimated based on average truck load. For landfill charges, the receipts of the charge could be used for estimating the quantity).	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. The Contractor(s) will estimate the missing data based on previous records and the activities carried out. The ET will review the results and forward to ER for approval.
Sufficient waste disposal points are provided. Wastes are collected and removed from site in a timely manner. General refuse is collected on a regular basis.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will instruct the Contractor(s) to remove waste accordingly.
Waste storage areas are properly cleaned and do not cause windblown litter and dust nuisance. Appropriate measures to reduce windblown litter and dust nuisance of waste will be adopted, e.g. by either covering trucks or by transporting wastes in enclosed containers.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will instruct the Contractor(s) to clean the storage area and/or cover the waste.
Different types of waste are segregated in different containers or skip to enhance reuse and recycling of material and proper disposal of waste.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will instruct the Contractor(s) to provide separate skips/ containers. The Contractor(s) will verify that the workers place the waste in the appropriate containers.
Chemical wastes are stored, handled and disposed of in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes, published by the EPD. Chemical wastes are separated for special handling and appropriate treatment at the Chemical Waste Treatment Centre at Tsing Yi.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will instruct the Contractor(s) to rectify the issues immediately. Warning will be given to the Contractor(s) if corrective actions are not taken within 24 hrs.
Demolition materials are properly covered before leaving the site.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will instruct the Contractor(s) to

Activities	Timing	Checking	If non-compliance noted, Action Required
			comply. The Contractor(s) will confirm that the demolition materials are properly covered when transport out of the site.
Wastes are disposed of at licensed sites.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will warn the Contractor(s) and instruct the Contractor(s) to confirm that the wastes are disposed of at the licensed sites. Should it involve chemical waste, the Waste Control Group of EPD will be notified.
Regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors are provided. A recording system for the amount of wastes generated/ recycled and disposal sites is developed and implemented.	Throughout the works	Each Week	The ET will inform the Contractor(s), IEC and ER. ER will instruct the Contractor(s) to comply.

6.4 Excavated Sediment Management

6.4.1 With reference to the Sediment Quality Report in the EIA, only Category L sediment was identified. In accordance with ETWB TCW No. 34/2002, Type 1 – Open Sea Disposal should be adopted for the disposal of 3,040 m^3 excavated sediment during construction of the proposed outfall diffuser. The location of marine disposal site should be sought with MFC/CEDD. The Contractor shall obtain a Marine Dumping Permit in accordance with the Dumping at Sea Ordinance. The Contractor should provide separate submissions (e.g. Sediment Sampling and Testing Plan / Sediment Quality Report) to EPD / DASO authority when applying for the Marine Dumping Permit under the Dumping at Sea Ordinance.

6.5 Waste Management EM&A

6.5.1 To facilitate monitoring and control over the contractors' performance on waste management, a waste inspection and audit programme will be implemented throughout the construction phase. The programme will look at the aspects of waste management including waste generation, storage, recycling, transport and disposal. An appropriate audit programme will be undertaken with the first audit conducted at the commencement of the construction works.

6.5.2 The aims of the waste inspection and audit programme are:

- To review the waste management practices in the Environmental Management Plan (EMP) including the quantities and types of C&D materials generated, reused and disposed of off-site; the amount of fill materials exported from/imported to the site and the quantity of timber used in temporary works construction for each process/activity;
- To confirm that the wastes arising from works are handled, stored, collected, transferred and disposed of an environmentally acceptable manner and comply with the relevant requirements under the Waste Disposal Ordinance (WDO) and its regulations;

- To confirm that the construction Contractor(s) properly implements the appropriate environmental protection and waste pollution control mitigation measures, as outlined in the EMP and the Implementation Schedule and presented in **Annex A**, to reduce and control the potential for waste impacts.
- To monitor the implementation and achievement of the EMP on site to assess its effectiveness; and
- To monitor the follow-up action on deficiencies identified.

6.5.3 Weekly audits of the waste management practices will be carried out during the construction phase to determine if wastes are being managed in accordance with the recommended good site practices and EMP. Joint site inspections and audits by the ET, the IEC and the contractor will be undertaken once per month. The inspection/ audit will look at all aspects of on-site waste management practices including waste generation, storage, recycling, transport and disposal. Particular attention will be given to the contractor's provision of sufficient spaces, adequacy of resources and facilities for on-site sorting and temporary storage of C&D materials. The C&D materials to be disposed of from the site will be visually inspected. The public fill for delivery to the off-site stockpiling area will contain no observable non- inert materials (e.g. general refuse, timber, etc). Furthermore, the waste to be disposed of at refuse transfer stations or landfills will as practicable contains no observable inert or reusable/recyclable C&D materials (e.g. soil, broken rock, metal, and paper/cardboard packaging, etc). Apart from site inspection, documents including licences, permits, disposal and recycling records will be reviewed and audited for compliance with the legislation and Contract requirements. Any irregularities observed during the site audits will be raised promptly to the contractor for rectification.

6.5.4 The findings of the waste audits will be reported in the Monthly EM&A Reports, Quarterly EM&A Reports and Annual/Final EM&A Reports.

7. ECOLOGY

7.1.1 The Project only affects a small area of subtidal soft bottom habitat of low ecological value and potentially affects Great Egret's usage of the Night Roosting Site. With the implementation of proposed mitigation measures and good site practices, no unacceptable ecological impacts from the construction of the Project are found. The implementation of the ecological mitigation measures (**Annex A**) will be inspected regularly as part of the EM&A procedures during the construction period.

7.1.2 As a precautionary measure, a pre-construction survey shall be conducted by the ET before the commencement of the construction activities to reconfirm the usage of the Night Roosting Site for Great Egret. If the Night Roosting Site is used by Great Egrets or other ardeid species, no works shall be undertaken within an area of 100m from the Night Roosting Site after 16:00 under normal working hours (i.e. 16:00 to 07:00 of the following day). In addition, strong artificial lighting should not be used in the area at night to avoid disturbance to the roosting ardeids. Clear signs should be erected on site to alert all site staff and workers about the requirement.

7.2 Impact Monitoring

7.2.1 The recommended good site practices and precautionary measures should be audited at least once every week as part of the site audit programme. The weekly site audit to be carried out by the ET should include checking whether good site practices and precautionary measures are being properly implemented by the Contractor.

7.2.2 The findings of the weekly site audits will be reported in the Monthly EM&A Reports, Quarterly EM&A Reports and Annual/Final EM&A Reports.

8. FISHERIES

8.1.1 The EIA concluded that the Project would not affect fisheries resources and fishing operations significantly. With the use of trenchless construction technique (i.e. HDD) for the construction of submarine discharge outfall which does not require dredging, it is anticipated that seabed sediments would not be disturbed and disturbance to fisheries habitat and fishing ground is hence not expected. Potential indirect water quality impact from sediment release due to the installation of sheetpiles (and removal after the completion) for cofferdam installation at submarine outfall, decommissioning of existing submarine outfall, vessel discharges and land-based site runoff from construction workforce are considered acceptable with the implementation of water quality mitigation measures. Considered that precautionary measures have been taken into account in the design and initial commissioning of the TSTP and STKSTW to minimize the risk of emergency sewage discharge, unacceptable operational phase impacts to fisheries resources and fishing operations are not anticipated. Compliance with the relevant discharge standards to control water quality impacts to within acceptable levels is also expected to control impacts to fisheries resources. Apart from water quality mitigation measures, no specific fisheries mitigation is required and the residual impact is considered acceptable.

8.1.2 Marine water quality monitoring programme at selected WSRs is recommended during construction and operation phases to ensure no unacceptable water quality impact is arising from the works. Details of the water quality monitoring and audit requirements and the associated event and action plans are described in *Section 5* of this Manual.

9. LANDSCAPE AND VISUAL

9.1.1 The EIA has recommended a series of landscape mitigation measures for both the construction and operational phases for the Project. These measures are summarised in the following tables:

Table 9.1: Proposed Construction Phase Landscape and Visual Mitigation Measures

ID No.	Mitigation Measures	Funding Agency	Implementation Agency
CM1	**Preservation of Existing Vegetation:** Existing trees designated to be retained in-situ will be properly protected. Tree protection measures to be undertake shall be in accordance with DEVB TC(W) 7/2015 on "Tree Preservation" and Guidelines on Tree Preservation during Development" by DEVB. This may include the clear demarcation and fencing-off of tree protection zones, tight site supervision and monitoring to prevent tree damage by construction activities, and periodic arboricultural inspection and maintenance to uphold tree health. A total of around 108 nos. of trees will be retained in-situ within the tree survey area. Under current proposal, no tree is recommended to be transplanted since the trees in conflict with the proposed works are not suitable to be transplanted. However, should transplantation be proposed in the detailed design stage after an update tree survey, the recommended final recipient sites should be adjacent to their current locations. Enough time should be reserved for tree transplantation works to increase the survival rate of the transplanting trees. To ensure the survival of transplanted trees, protection work should be considered. The tree transplantation proposal will be submitted to relevant authorities for approval together with the formal tree removal application. Tree transplanting works shall be undertaken in accordance with Guidelines on Tree	DSD	DSD (via Contractor)

	Transplanting by DEVB.		
CM2	**Control of Site Construction Activities:** Construction site controls shall be enforced, where possible, to ensure that the landscape and visual impacts arising from the construction phase activities are minimised. These construction site controls should include but not limited to the following: · Storage of materials should be carefully arranged to minimise potential landscape and visual impact. · The location and appearance of site accommodation should be carefully designed to minimise potential landscape and visual impact. · Site lighting should be carefully designed to prevent light spillage, · Extent of the works area and construction period should be minimised as far as practicable. · Screen hoarding with compatible design to blend into the surrounding natural environmental should be considered (Screen hoarding may not be practicable for works of upgrading existing rising mains due to the spatial constraints of the works area along the Shun Hing Street). · Temporary works areas should be reinstated at the earliest possible opportunity.	DSD	DSD (via Contractor)
CM3	**Suitable design of the proposed TSTP:** ▪ Colour of natural tones and non-reflective building materials shall be used for any outward facing building facades to avoid visual and glare disturbance ▪ Responsive lighting design - Directional and full cut off lighting is recommended to minimise light spillage to the surroundings; - Minimise geographical spread of lighting, only applying for safety at the key access points of the TSTP; and - Limited lighting intensity to meet the minimum safety and operation requirement.	DSD	DSD (via Contractor)

Table 9.2: Proposed Operation Phase Landscape and Visual Mitigation Measures

ID No.	Mitigation Measures	Funding Agency	Implementation Agency	Management Agency
OM1	**Suitable design of the proposed STK STW:** ▪ Colour of natural tones and non-reflective building materials shall be used for any outward facing building facades to avoid visual and glare disturbance ▪ Responsive lighting design - Directional and full cut off lighting is recommended within the boundaries of STK STW to minimise light spillage to the surroundings; - Minimise geographical spread of lighting, only applying for safety at the key access points of the STK STW; and - Limited lighting intensity to meet the minimum safety and operation requirement.	DSD	DSD (via Contractor)	DSD
OM2	**Amenity / Compensatory Planting :** 0.15ha planting area (0.03ha amenity planting area and 0.12ha compensatory planting area) have been reserved in the preliminary design. i. 0.12ha of compensatory planting area is allocated for planting of 31 heavy standard trees (total DBH of 3.1m) to compensate the loss of 18 trees proposed to be felled (total DBH of 3.1m). The proposed compensation ratio is 1:1.72 and 1:1 in terms of tree number and total DBH respectively. The proposed new trees shall be native species of amenity	DSD	DSD (via Contractor)	DSD

	value and at the same time of low maintenance requirements. Recommended tree species include *Schima superb, Cinnamomum burmannii a*nd *Schefflera heptaphylla*. This preliminary compensation proposal will form part of the tree removal application which will be controlled by the DEVB TC(W) 7/2015 – Tree Preservation. Tree risk assessment to all trees within the project site would be undertaken where applicable in accordance with Guidelines for Tree Risk Assessment and Management Arrangement; ii. Apart from compensatory tree planting, amenity planting of shrubs will be provided within the 0.03ha amenity planting area. A minimum of 1,380 shrubs will be planted. Recommended native shrub species include *Litsea rotundifolia, Rhaphiolepis indica* and *Rhodomyrtus tomentosa*. iii. the entire 0.15ha planting area (i.e. amenity and compensatory planting area) will be hydroseeded by native grass species *Eremochloa ophiuroides* to provide ground cover greening.			
OM3	**Amenity enhancement :** Rooftop greening and vertical greening to mitigate the visual impact of taller structures can soften the façade of STK STW structures.	DSD	DSD (via Contractor)	DSD

Note: OM1-3 are operational phase landscape and visual mitigation measures, which are recommended to be well planned and designed at design stage to ensure these measures are properly incorporated and optimized in the project.

9.1.2 The Contractor should implement landscape construction works and subsequent maintenance operations and undertake tree risk assessment during construction stage and the 12 month establishment period. A professionally qualified Resident Landscape Architect, i.e. Registered Landscape Architect (RLA) will supervise, monitor and ensure that all recommended landscape and visual mitigation measures under Chapter 9 of the EIA Report are effectively implemented.

9.1.3 All measures undertaken by the Contractor during the construction phase and first year of the operational phase should be audited by the Environmental Team, on a regular basis to ensure compliance with the intended aims of the measures.

9.1.4 Site inspections should be undertaken at least once every two weeks throughout the construction period and once every two months during the operational phase. The scope of the audit is detailed below. Operational phase auditing would be restricted to the last 12 months of the establishment works of the operational landscape measures.

- The extent of the agreed works areas should be regularly checked during the construction phase. Any trespass by the Contractor outside the limit of the works;
- The progress of the engineering works should be regularly reviewed on site to identify the earliest practical opportunities for the landscape works to be undertaken;
- All landscaping works are carried out in accordance with the specifications;
- The planting of new trees and other plants, are carried out properly; and
- All necessary horticultural operations and replacement planting are undertaken throughout the maintenance period to ensure the healthy establishment.

9.1.5 In the event of non-compliance identified during the site inspection, the responsibilities of the relevant parties are detailed in the Event/Action plan provided in table below:

Table 9.3: Event / Action Plan for Landscape and Visual during Construction Phase

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Non-conformity on one occasion	1. Inform the Contractor, IEC and ER; 2. Discuss remedial actions with IEC, ER and Contractor 3. Monitor remedial actions until rectification has been completed	1. Check inspection report 2. Check Contractor's working method 3. Discuss with ET, ER and Contractor on possible remedial measures 4. Advise ER on effectiveness of proposed remedial measures	1. Confirm receipt of notification of non-conformity in writing 2. Review and agree on the remedial measures proposed by the Contractor 3. Supervise implementation of remedial measures	1. Identify source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with ER as appropriate 4. Rectify damage and undertake any necessary replacement
Repeated Non-conformity	1. Identify source(s) 2. Inform the Contractor, IEC and ER; 3. Discuss inspection frequency 4. Discuss remedial actions with IEC, ER and Contractor 5. Monitor remedial actions until rectification has been completed 6. If non-conformity stops, cease additional monitoring	1. Check inspection report 2. Check Contractor's working method 3. Discuss with ET, ER and Contractor on possible remedial measures 4. Advise ER on effectiveness of proposed remedial measures	1. Notify the Contractor 2. In consultation with the ET and IEC, agree with the Contractor on the remedial measures to be implemented 3. Supervise implementation of remedial measures	1. Identify source and investigate the non-conformity 2. Implement remedial measures 3. Amend working methods agreed with ER as appropriate 4. Rectify damage and undertake any necessary replacement. Stop relevant portion of works as determined by ER until the non-conformity is abated.

Notes: ET – Environmental Team; IEC – Independent Environmental Checker; ER – Engineer's Representative

10. CULTURAL HERITAGE

10.1.1 The EIA has confirmed that the Project will not cause any cultural heritage impact and it is unnecessary to take further mitigation measure. No specific EM&A requirement is therefore required.

11. ENVIRONMENTAL SITE INSPECTION

11.1 Site Inspections

11.1.1 Site inspections provide a direct means to track and ensure the enforcement of specified environmental protection and pollution control measures. Regular site inspections will be carried out by the ET and the Contractor once per week during construction phase. During operation phase, regular site audit shall be carried out to cover all planting works for a period of not less than 12-months. The IEC will also undertake monthly site audit to assess the performance of the Contractor(s). Additionally, the ET will be responsible for defining the scope of the inspections, detailing any deficiencies that are identified, and reporting any necessary action or mitigation measures that were implemented as a result of the inspection; the results of the inspections should be made available to the Contractor, IEC and ER.

11.1.2 The areas of inspection should include the general environmental conditions in the vicinity of the Site and pollution control and mitigation measures within the Site; it should also review the environmental conditions outside the site area which are likely to be affected, directly or indirectly, by site activities. The ET should make reference to the following information in conducting the inspections:

- the EIA and EM&A recommendations on environmental protection and pollution control mitigation measures;
- ongoing results of the EM&A programme;
- works progress and programme;
- individual works method statements which will include proposals on associated pollution control measures;
- contract specifications on environmental protection; and
- relevant environmental protection and pollution control laws.

11.1.3 The ET's inspection findings and their associated recommendations on improvements to the environmental protection and pollution control works should be submitted to the IEC and the Contractor within 24 hours, for comment and for taking immediate action. They should also be presented, along with the remedial actions taken, in the monthly EM&A reports. The Contractor should follow the procedures and time-frames stipulated in the environmental site inspection for the implementation of mitigation proposals. An action reporting system should be formulated and implemented to report on any remedial measures implemented subsequent to the site inspections.

11.1.4 Ad hoc site inspections should also be carried out by the ET and IEC if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the associated investigation work.

11.2 Compliance with Legal & Contractual Requirements

11.2.1 There will be contractual environmental protection and pollution control requirements as well as Hong Kong's environmental protection and pollution control laws which the construction activities will comply with.

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

11.2.3 The Contractor should also regularly copy relevant documents to the ET Leader, IEC, ER and Project Proponent so that the checking work can be carried out. The relevant documents are expected to include the updated Work Progress Reports, the updated Works Programme, application letters for different licences/permits under the environmental protection laws, and all the valid licences/permit. The site diary should also be available, upon request, to the ET Leader during his site inspection.

11.2.4 After reviewing the documentation, the ET should advise IEC, ER, Project Proponent, EPD and 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 is incompatible with the works programme or may result in potential violation of environmental protection and pollution control requirements by the works in due course, he should also advise the Contractor accordingly.

11.2.5 Upon receipt of the advice, the Contractor should undertake immediate action to remedy the situation. The ET, IEC and ER should follow up to ensure the appropriate actions have been taken by the Contractor in order that the environmental protection and pollution control requirements are fulfilled.

11.3 Environmental Complaints

11.3.1 The ET Leader should undertake the following procedures upon receipt of a complaint:

- log complaint and date of receipt into the complaint database and inform the Contractor, ER, IEC and Project Proponent immediately;
- investigate the complaint jointly with the Contractor and the IEC and discuss with the Contractor and IEC to determine its validity and to assess whether the source of the issue is due to construction or operation of the Project;
- if a complaint is considered valid due to the construction or operation activities, the ET Leader should identify mitigation measures in consultation with the Contractor, and submitted to the IEC and ER for review. The ER should report the results to the Project Proponent;
- if mitigation measures are required, the ET Leader should advise the Contractor accordingly;
- review the Contractor's response on the identified mitigation measures and the updated situation;
- if the complaint is transferred from EPD, an interim report should be submitted to EPD on the status of the complaint investigation and follow-up action within the time frame assigned by EPD;
- undertake additional monitoring and audit to verify the situation if necessary and ensure that any valid reason for complaint does not recur;
- report the investigation results and the subsequent actions on the source of the complaint for responding to complainant. If the source of complaint is EPD, the results 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.

11.3.2 During the complaint investigation work, the Contractor and ER shall cooperate with the ET Leader in providing all necessary information and assistance for completion of the investigation. If mitigation measures are identified in the investigation, the Contractor should promptly carry out the mitigation measures. EPD will approve the proposed mitigation measures and the ET Leader and IEC should check that the measures have been carried out by the Contractor.

11.4 Log-Book

11.4.1 The ET Leader should keep a contemporaneous log-book of each and every instance or circumstance or change of circumstances which may affect the findings of the environmental impact assessment and non-compliance with the Environmental Permit. The ET Leader should notify the IEC within one working day of the occurrence of any such instance or circumstance or change of circumstance. The ET Leader's log-book should be kept readily available for inspection by persons (such as IEC and Contractor) assisting in supervision of the implementation of the recommendations of the EIA Report and the conditions set out in the Environmental Permit, or by EPD or his authorised officers.

12. REPORTING

12.1.1 Reports can be provided in an electronic medium upon agreeing the format with the Contractor, IEC, IC, Project Proponent and the EPD. All the monitoring data should also be submitted on diskettes or CD Rom.

12.2 Baseline Monitoring Report

12.2.1 The ET Leader shall prepare and submit a Baseline Environmental Monitoring Report within 10 days of completion of the baseline monitoring. The Baseline Monitoring Report will be submitted to the Contractor, IEC, ER and EPD. The baseline monitoring report will include at least 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;

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

- monitoring methodology;
- name of laboratory and types of equipment used and calibration details;
- parameters monitored;
- monitoring locations;
- 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 (A/L levels) for each monitoring parameter and statistical analysis of the baseline data;

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

(ix) comments and conclusions.

12.3 Monthly EM&A Report

12.3.1 The results and findings of all EM&A works required in the Manual should be recorded in the monthly EM&A Reports and be prepared by the ET and verified by the ET Leader. The reports will be submitted to the Contractor, IEC and EPD within 10 working days of the end of each reporting month, with the first report due in the month after construction works commence. The ET should liaise with the relevant parties to confirm the exact number and format of monthly reports in both hard copy and electronic format. The report should include, but not be limited to, the following elements:

First Monthly EM&A Report

12.3.2 The first monthly EM&A report should include at least but not be limited to the following:

(i) Executive Summary (1-2 pages);

- Exceedances of Action/Limit Levels;
- Complaint Log;
- Notifications of any summons and successful prosecutions;
- Reporting Changes;
- 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; and
- Works undertaken during the month.

(iii) Environmental Status

- Works undertaken during the month with illustrations (such as location of works); and
- Drawing showing the Project area, any environmental sensitive receivers.

(iv) Summary of EM&A requirements including:

- Environmental mitigation measures, as recommended in the EIA Report;
- Environmental monitoring requirements and contractual requirements;

(v) Implementation Status

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

(vi) Site Audit Report

(vii) Monitoring results (in both hard and diskette copies) together with the following information:

- Monitoring methodology;
- Name of laboratory and equipment used and calibration details;
- Parameters monitored;
- Monitoring locations (and depth); and
- Monitoring date, time, frequency, and duration.

(viii) Report on Complaints, Notifications of Summons and Successful Prosecutions

- Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation's, including locations and nature of the breaches, investigation, follow-up actions taken, results and summary;

- Review of the reasons for and the implications of non-compliance, complaints, summons and prosecutions including review of pollution sources and working procedures; and
- Description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.

(ix) Others

- An account of the future key issues as reviewed from the works programme and work method statements; and
- Submission of implementation status proforma, proactive environmental protection proforma, regulatory compliance proforma, site inspection proforma, data recovery schedule and complaint log summarising the EM&A of the period.

Subsequent Monthly Report

12.3.3 The subsequent monthly EM&A reports should include the following:

(i) Executive Summary (1-2 pages)

- Exceedances of Action/Limit Levels;
- Complaint Log;
- Notifications of any summons and successful prosecutions;
- Reporting Changes;
- Future key issues.

(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 month with illustrations including key personnel contact names and telephone numbers; and
- Drawing showing the project area, any environmental sensitive receivers.

(iii) Implementation Status

- Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study 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 equipment used and calibration details;
- Parameters monitored;
- Monitoring locations (and depth); and
- Monitoring date, time, frequency, and duration.

(v) Report on Complaints, Notifications of Summons and Successful Prosecutions

- Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation's, 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.

(vii) Appendix

- Supporting documents
- Outstanding issues and deficiencies.

12.4 Quarterly EM&A Summary Reports

12.4.1 The quarterly EM&A summary report should contain the following listed information:

(i) Executive summary (up to half page);

(ii) Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;

(iii) A brief summary of EM&A requirements including:

- Monitoring parameters;
- Environmental quality performance limits (Action and Limit levels); and
- Environmental mitigation measures, as recommended in the Final EIA;

(iv) Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the Final EIA, summarised in the updated implementation schedule;

(v) Drawings showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

(vi) Graphical plots of the trends of monitored parameters over the past 4 months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:

- The major activities being carried out on site during the period;
- Weather conditions during the period; and
- Any other factors which might affect the monitoring results;

(vii) Advice on the solid and liquid waste management status;

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

(ix) A brief review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures;

(x) A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;

(xi) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

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

(xiii) Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and

(xiv) Project Proponents' contacts and any hotline telephone number for the public to make enquiries.

12.5 Annual EM&A Review Report

12.5.1 The Annual EM&A Review Report should contain the following listed information:

(i) Executive summary (up to half page);

(ii) Drawings showing the Project area, environmental sensitive receivers and monitoring and control stations;

(iii) Basic project information including a synopsis of the project organisation, programme, contacts of key management, and a synopsis of work undertaken during the quarter;

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

- Monitoring parameters;
- Environmental quality performance limits (Action and Limit levels); and
- Environmental mitigation measures, as recommended in the Final EIA;

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

(vi) Graphical plots of the trends of monitored parameters over the past 4 months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:

- The major activities being carried out on site during the period;
- Weather conditions during the period; and
- Any other factors which might affect the monitoring results;

(vii) A summary of non-compliance (exceedances) of the environmental quality performance limits (Action and Limit 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) A summary record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislations, locations and nature of the breaches, investigation, follow-up actions taken and results;

(xii) Comments (e.g. effectiveness and efficiency of the mitigation measures), recommendations (e.g. any improvement in the EM&A programme) and conclusions for the quarter; and

(xiii) Project Proponents' contacts and any hotline telephone number for the public to make enquiries.

12.6 Final EM&A Summary Report

12.6.1 The EM&A programme will be terminated upon the completion of the construction works and specified operation phase monitoring period so that the potential to cause significant environmental impacts is ceased and the post-project monitoring is concluded.

12.6.2 The final EM&A summary report will include, inter alia, the following:

(i) An executive summary;

(ii) Drawings showing the project area, any environmental sensitive receivers;

(iii) Basic project information including a synopsis of the project organisation, programme, contracts of key management, and a synopsis of work undertaken during the entire construction period;

(iv) A brief summary of EM&A requirements including: environmental mitigation measures, as recommended in the EIA Report;

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

(vi) Provide clear-cut decisions on the environmental acceptability of the Project with reference to the specific impact hypothesis;

(vii) A summary description of the actions taken in the event of non-compliance and any follow-up procedures related to earlier non-compliance;

(viii) A summary record of all complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken;

(ix) A summary record of notification of summons and successful prosecutions for breaches of the current environmental protection/ pollution control legislation's, locations and nature of the breaches, investigation, follow-up actions taken and results;

(x) Review the practicality and effectiveness of the EIA process and EM&A programme (eg effectiveness and efficiency of the mitigation measures) recommend any improvement in the EM&A programme; and

(xi) A conclusion to state the return of ambient and/or the predicted scenario as per EIA findings.

12.7 EM&A Report for Operation Phase

12.7.1 The EM&A reports shall submit monthly in operation phase and should include the following:

(i) Executive Summary (1-2 pages)

- Exceedances of Action/Limit Levels;
- Complaint Log;
- Notifications of any summons and successful prosecutions;
- Reporting Changes;
- Future key issues.

(ii) Environmental Status

- environmental protection/ mitigation measures for the month;
- Works undertaken during the month with illustrations including key personnel contact names and telephone numbers; and
- Drawing showing the project area, any environmental sensitive receivers.

(iii) Implementation Status

- Advice on the implementation status of environmental protection and pollution control/mitigation measures, as recommended in the project EIA study 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 equipment used and calibration details;
- Parameters monitored;
- Monitoring locations (and depth); and
- Monitoring date, time, frequency, and duration.

(v) Report on Complaints, Notifications of Summons and Successful Prosecutions

- Record of all complaints received (written or verbal) for each media, including locations and nature of complaints investigation, liaison and consultation undertaken, actions and follow-up procedures taken, results and summary;
- Record of notifications of summons and successful prosecutions for breaches of the current environmental protection/pollution control legislation's, 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.

(vii) Appendix

- Supporting documents
- Outstanding issues and deficiencies.

12.8 Data Keeping

12.8.1 Documentation such as the monitoring field records, site inspection forms, etc. are not required to be included in the monthly EM&A reports for submission. However, such documents should be well kept by the ET Leader and should be available for the inspection of the IEC, Project Proponent and EPD upon request. All relevant information should be clearly and systematically recorded in the documents. The monitoring data should also be recorded in electronic format. All the documents and data should be kept for at least five years after completion of the Extension contract.

End of Text