Improvement of Yuen Long Town Nullah (Town Centre Section)

Environmental Monitoring and Audit Manual

Black & Veatch Hong Kong Limited
43/F, AIA Kowloon Tower
100 How Ming Street,
Kwun Tong
Kowloon, Hong Kong

Drainage Services Department
Project Management Division
42/F, Revenue Tower
5 Gloucester Road,
Wan Chai, Hong Kong

March 2020

CONTENT

Page

CONTENT

Page

END OF TEXT

LIST OF TABLES

LIST OF FIGURES

ANNEXES

1. INTRODUCTION

1.1 Project Background

1.1.1 The existing Yuen Long Town Nullah (YLTN) was constructed in mid 1960s to alleviate the flooding risks in the Northwest New Territories and is one of the oldest drainage systems in Hong Kong. Most of the nullah sections were originally natural water courses, which have been straightened and modified. The nullahs now primarily consist of channelized concrete bedding and embankments.

1.1.2 With the increasing aspirations for a better living environment, the local residents of Yuen Long are requesting the Government to improve the early design of the YLTN, which is considered no longer in line with the changing townscape of Yuen Long. In addition, odour from the nullah due to the polluted dry weather flow is causing nuisance to the nearby residents.

1.1.3 In relation to the above, the Drainage Services Department (DSD) of the Government of the Hong Kong Special Administrative Region (HKSARG) commissioned the "*Agreement No. CE 39/2006 (DS) Rehabilitation of Yuen Long Town Nullahs - Feasibility Study*" to investigate different options for improving the design and environmental conditions of the YLTN. The recommendation from the Feasibility Study to intercept the polluted dry weather flow to the Town Centre Section of YLTN provides the basis of scope of improvements for the current Project. Details of the Project are provided in *Section 1.3* below.

1.2 Purpose of the Manual

1.2.1 Black & Veatch Hong Kong Limited (B&V) was commissioned by DSD to undertake the Environmental Impact Assessment (EIA) Study of the Project (the Assignment). An EIA Study addressing the requirements of the Hong Kong *Environmental Impact Assessment Ordinance (EIAO)* has been prepared. This Environmental Monitoring and Audit (EM&A) Manual (the Manual) is a supplementary document to the EIA Report.

1.2.2 The Manual has been prepared in accordance with the EIA Study Brief (No. ESB - 260/2013) 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 of the Project. It provides systematic procedures for monitoring and auditing the environmental performance of the Project. This Manual contains the following information:

- Appropriate background information on the construction of the Project with reference to relevant technical reports;

- Responsibilities of the Contractor(s), Environmental Team (ET), and the Independent Environmental Checker (IEC) with respect to the EM&A requirements during the implementation of the Project;
- Project organisation;
- Requirements with respect to the construction and operational programme schedule and the necessary EM&A programme to track the varying environmental impact;
- Descriptions of the parameters to be monitored and criteria through which performance will be assessed including: monitoring frequency and methodology, monitoring locations (typically, the location of sensitive receivers as listed in the EIA), monitoring equipment lists, event contingency plans for exceedances of established criteria and schedule of mitigation and best practice methods for reduced adverse environmental impacts;
- Procedures for undertaking on-site environmental performance audits as a means of ensuring compliance with environmental criteria;
- Details of the methodologies to be adopted including field, laboratory and analytical procedures, and details on quality assurance and quality control (QA/QC) programme;
- Preliminary definition of Action and Limit (A/L) levels;
- Establishment of Event and Action plans (EAPs);
- Requirements for reviewing pollution sources and working procedures required in the event of exceedances of applicable environmental criteria and/or receipt of complaints;
- Requirements for presentation of EM&A data and appropriate reporting procedures; and
- Requirements for review of EIA predictions and the effectiveness of the mitigation measures and the EM&A programme.

1.3 Project Description

Project Scope

1.3.1 The Project comprises improvement works for the Town Centre Section of the YLTN by intercepting the polluted dry weather flow for treatment at the YLSTW. The general location plan of the Project is shown in **Figure 1.1**.

1.3.2 The improvement works for the Town Centre Section of the YLTN mainly comprises of the following items and the general layout plan is shown in **Figure 1.2**.

a) Construction of DWF interceptors along and within the YLTN;
b) Construction of continuous u-channels adjacent to either side of the retaining walls;
c) Construction of a DWF pumping station with capacity of 18,000 m^3/day; and
d) Laying twin rising mains of approximately 400 m long to convey the intercepted DWF to the YLEPP (upgraded from the existing YLSTW).

1.3.3 YLTN is concrete-lined with a total length of approximately 12 kilometers dividing into five sections namely Downstream Section, Town Centre Section, Upstream Section, West Nullah and East Nullah.

1.3.4 The DWFI system adopts continuous u-channels/pipes adjacent to either side of the retaining walls to collect and convey the expedient discharges from the drainage outlets. The system was further optimised with external covers, screening the presence of the drainage outlet to minimise visual and odour impact as far as practicable.

1.3.5 The latest Interception Scheme for DWF in YLTN is presented in **Figure 1.3**. The DWFI system will be constructed to intercept the polluted dry weather flow being discharged to YLTN from the Town Centre Section (600 m^3/day), East Nullah (16,300 m^3/day) and upstream San Hui Nullah (1,000 m^3/day). Approximately 60 nos. of existing storm water outfalls within the Town Centre Section will be intercepted by the proposed system.

1.3.6 The DWF from upstream Kung Um Road Nullah (13,100 m^3/day) will not be intercepted at the upstream as such to maintain water flow within the Town Centre Section during non-rainy days. The DWF from West Nullah (3,600 m^3/day) will be intercepted to proposed u-channel/pipe but not treated in YLEPP. Instead, it will be conveyed to existing desilting basin and eventually, together with the DWF from upstream Kung Um Road Nullah, pumped across the rubber dam and towards Shan Pui River via the existing low flow pumping station, which conveys DWF on the nullah across the inflatable dam. This existing low flow pumping station is located at the downstream at Shan Pui Ho Road East.

1.3.7 The DWFI system will convey the first 18,000 m^3 of DWF being intercepted each day to the YLEPP for treatment. When the above limit is reached, the exceeded DWF will be overflown directly or as close as possible to the desilting basin of the existing low flow pumping station (LFPS) and mixed with the DWF of Kung Um Road Nullah and West Nullah before being discharged to Shan Pui River through the existing LFPS.

1.3.8 The intercepted/diverted DWF will flow by gravity to a proposed DWF pumping station to be constructed downstream near the existing low flow pumping station at Shan Pui Ho Road East. The proposed DWF pumping station will be a single storey building structure about 17 m in length, 10 m in width and 7 m in height. It comprises an underground covered inlet chamber, screen chamber with mechanical screen, wet well, ventilation systems, odour control facilities and various associated facilities. Twin rising mains of approximately 400 m long will be laid which will be used to convey the first 18,000 m^3 of DWF each day from the pumping station to the existing sewers, located at Wang Lok Street, leading to the YLEPP. The diameter of the rising main is around 600 mm.

1.3.9 The scale of the proposed Project is summarized in **Table 1.1**.

Table 1.1 Scale of Proposed Project

Nature of Work	Details (Dimensions) of Works
DWFI System	1. Construction of DWF interceptors along and within the YLTN; 2. Construction of continuous 1000 mm × 800 mm u-channels adjacent to either side of the retaining walls; 3. Construction of a DWF pumping station (17m(L) × 10m(W) × 7m(H)) with capacity of 18,000m^3/day; and 4. Laying twin rising mains of approximately 400 m long with 600 mm diameter each.

Construction Programme

1.3.10 The construction programme for the Project is tentatively expected to commence in second quarter of 2021 for completion in early 2026. The Project will be constructed in sections as shown in **Figure 1.2**. The tentative key milestone dates are tabulated in **Table 1.2** below.

Table 1.2 Tentative Construction Schedule

	2021			2022				2023				2024				2025				2026
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Construction of DWFI System																				
Section A – A1																				
Section A – A2																				
Section A – A3																				
Section A – A4																				
Section B – B1																				
Section B – B2																				
Section B – B3																				
Construction of Rising Mains																				
Rising Main																				
Construction of DWF Pumping Station																				
DWF PS																				

Note:
(1) DWFI – Dry Weather Flow (DWF) Interceptors and associated u-channels
(2) DWF PS – DWF Pumping Station
(3) Shaded cells indicate construction activities in progress during the quarter concerned

Construction Works

1.3.11 Construction of the proposed Project comprises the following key activities:

- Ground breaking;
- Excavation works;
- Pipe laying works;
- Backfilling works; and
- Final re-instatement by in-situ concreting.

1.4 Objectives of the EM&A

1.4.1 The broad objective of this 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 described in the EIA Report. The EIA Report also specifies mitigation measures and good construction practices that will be needed to comply with the environmental criteria or further minimise the potential impacts. These mitigation measures and their implementation requirements are presented in the Implementation Schedule of Mitigation Measures (see *Annex A*).

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

- Provide baseline information against which any short or long term environmental impacts of the projects can be determined;
- Provide an early indication should any of the environmental control measures or practices fail to achieve the acceptable standards;
- Monitor the performance of the Project and the effectiveness of mitigation measures;
- Verify the environmental impacts identified in the EIA;
- Determine Project compliance with regulatory requirements, standards and government policies;
- Take remedial action if unexpected results or unacceptable impacts arise; and
- Provide data to enable an environmental audit to be undertaken at regular intervals.

1.4.3 The EIA Study indicates that an EM&A programme will be required for the pre-construction, construction and operation phases of this Project. A summary of the requirements for each of the environmental parameters is detailed in **Table 1.3**.

Table 1.3 Summary of EM&A Parameters

Parameter	**Phases**		
	Pre-Construction Phase	**Construction Phase**	**Operation Phase**
Air Quality (Odour)	M	M [(a)] + SI [(b)]	-
Noise	M	M + SI	-
Water Quality	M	M + SI	-
Waste	-	SI	-
Landscape and Visual	SI [(c)]	SI	SI

Notes:
(a) M – Environmental monitoring
(b) SI - Site inspection
(c) Prior to construction, photographic record of the Project Site at the time of the Contractor's possession should be prepared.

1.5 Scope of the EM&A Programme

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

- Establish baseline odour patrol at Project Site boundary and implement monitoring requirements for odour patrol monitoring programme during construction;
- Establish baseline noise levels at specified locations and implement monitoring requirements for noise monitoring programme during construction;
- Establish baseline water quality levels for water quality monitoring and implement monitoring requirements for water quality monitoring programme during construction;
- Implement inspection and audit requirements for air quality, noise, water quality, waste management and landscape and visual impacts;
- 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:
  - the level of the Contractor's general environmental awareness;
  - the Contractor's implementation of the recommendations in the EIA and their contractual obligations;
  - the Contractor's performance as measured by the EM&A;
  - the need for specific mitigation measures to be implemented or the continued usage of those previously agreed; and
  - to advise the site staff of any identified potential environmental issues;
- Produce monthly EM&A reports which summarise EM&A 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.

1.6 Organisation & Structure of the EM&A

1.6.1 The EM&A will require the involvement of the Project Proponent (DSD), Engineer Representative (ER), an ET, an IEC and the Contractor(s). The roles and responsibilities of the various parties involved in the EM&A process are further expanded in the following section.

Project Organisation

1.6.2 DSD will establish an ET to conduct the site inspection and monitoring and, to provide specialist advice on implementation of environmental responsibilities.

1.6.3 The ET will have previous relevant experience with managing similarly sized EM&A programmes and the ET Leader will be a recognised environmental professional, with a minimum of seven years relevant experience in impact assessments and EM&A programmes. The ET Leader will be responsible for, and in charge of, the ET; and will be the person responsible for executing the EM&A requirements, and to provide advice (if required) on environmental clauses for Contract Specifications of the Project.

1.6.4 DSD will appoint an IEC to verify and validate/ audit the environmental performance of the Contractor(s) and works of the ET, and to maintain strict control of the EM&A process. The IEC will have previous relevant experience with checking and auditing similarly sized EM&A programmes and the IEC will be a recognised environmental professional, with a minimum of seven years relevant experience in impact assessments and EM&A programmes.

Roles & Responsibilities

1.6.5 Roles and responsibilities of DSD and their ER, Contractor(s), the ET and the IEC are detailed in *Sections 1.6.6* through *1.6.10*.

1.6.6 DSD will:

- Establish an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring data, and site inspection of construction works; and
- Employ an IEC to audit and verify the overall environmental performance of the works and to assess the effectiveness of the ET in their duties.

1.6.7 The ER of DSD will:

- Supervise the Contractor's activities and confirm that the requirements in the EM&A Manual and the Contract Documents are fully complied with;

- Develop appropriate contract clauses to confirm that the Contractor(s) will have qualified professionals to interface with the DSD/ ER / ET /IEC to fulfil the EIA/EP requirements;
- Inform the Contractor(s) when action is required to reduce impacts in accordance with the EAPs;
- Adhere to the procedures for carrying out complaint investigation; and
- Participate in joint site inspections undertaken by the ET and IEC.

1.6.8 The Contractor(s) are responsible to:

- Employ an ET to undertake monitoring, laboratory analysis and reporting of environmental monitoring data, and site inspection of construction works
- Work within the scope of the construction contract and other regulatory requirements;
- Provide assistance to the ET in carrying out environmental monitoring and site inspections;
- Submit proposals on mitigation measures in case of exceedances of the A/L levels in accordance with the EAPs;
- Implement measures to reduce impact where A/L levels are exceeded;
- Implement the corrective actions instructed by DSD/ER/ET/IEC;
- Participate in the site inspections undertaken by the ET and the IEC, as required, and undertake any corrective actions instructed by DSD/ER/ETL/IEC; and
- Adhere to the procedures for carrying out complaint investigation.

1.6.9 The ET will:

- Monitor various environmental parameters as required in this Manual;
- Assess the EM&A data and review the success of the EM&A programme in determining the adequacy of the mitigation measures implemented and the validity of the EIA predictions as well as identify any adverse environmental impacts before they arise;
- Carry out regular site inspection to investigate the Contractor's site practice, equipment and work methodologies with respect to pollution control and environmental mitigation, and effect proactive action to pre-empt issues;
- Review the Contractor's working programme and methodology, and comment as necessary;
- Review and prepare reports on the environmental monitoring data and site environmental conditions;
- Report on the environmental monitoring results and conditions to the IEC, Contractor(s), ER, DSD and EPD;
- Recommend suitable mitigation measures to the Contractor(s) in the case of exceedance of A/L levels in accordance with the EAPs; and
- Adhere to the procedures for carrying out complaint investigation.

1.6.10 The IEC will:

- Review and audit the implementation of the EM&A programme and the overall level of environmental performance being achieved;
- Arrange and conduct monthly independent site audits of the works;
- Validate and confirm the accuracy of monitoring results, monitoring equipment, monitoring stations, monitoring procedures and locations of sensitive receivers;
- Audit the EIA recommendations and requirements against the status of implementation of environmental protection measures on site;
- On an as needed basis, audit the Contractor's construction methodology and agree the appropriate, reduced impact alternative in consultation with DSD, the ER, the ET and the Contractor(s);
- Adhere to the procedures for carrying out complaint investigation;
- Review the effectiveness of environmental mitigation measures and project environmental performance including the proposed corrective measures;
- Review EM&A report submitted by the ET leader and feedback audit results to ET by signing off relevant EM&A proformas; and
- Report the findings of site audits and other environmental performance reviews to DSD, ER, ET, EPD and the Contractor(s).

Key Contact Information

1.6.11 Key contact information, to be updated when details are available, will be provided in a similar format as in **Table 1.4**.

Table 1.4 Contact Information - to be completed prior to commencement of construction

Name	Position	Telephone	Facsimile	E-mail
DSD – EP Holder				
To be confirmed				
ER				
To be confirmed				
Contractor(s)				
To be confirmed				
ET				
To be confirmed				
IEC				
To be confirmed				

1.7 Structure of the EM&A Manual

1.7.1 The remainder of the Manual is organized as follows:

- *Section 2* lists the EM&A general requirements;
- *Section 3* describes the EM&A requirements for air quality;
- *Section 4* provides the EM&A requirements for noise;
- *Section 5* provides the EM&A requirements for water quality;
- *Section 6* describes the audit requirements for waste management;
- *Section 7* describes the audit requirements for landscape and visual;
- *Section 8* describes the scope and frequency of environmental site inspection; and
- *Section 9* details the reporting requirements for the EM&A programme.
- *Annex A* includes Implementation Schedule of Mitigation Measures.
- *Annex B* provides a Construction Phase Noise Monitoring Field Record Sheet.
- *Annex C* provides the compliant log.
- *Annex D* provides sample template for interim notifications of environmental quality limits exceedances

2. EM&A GENERAL REQUIREMENTS

2.1 Introduction

2.1.1 This section describes the general requirements of the EM&A programme for the Project. The scope of the programme is developed with reference to the findings and recommendations of the EIA Report.

2.2 Construction Phase EM&A

General

2.2.1 Potential environmental impacts, 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 Manual and in the construction contracts.

2.2.2 During the construction phase of the Project, air quality, noise and water quality will be subject to EM&A, whilst environmental audit being undertaken for construction waste management and landscape and visual as recommended 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 cover air quality, noise and water quality and will form an important part of the whole EM&A programme.

Action and Limit (A/L) Levels

2.2.4 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:* levels beyond which there is a clear indication of a deteriorating environmental conditions 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, Hong Kong Planning Standards and Guidelines (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 (EAPs)

2.2.5 The purpose of the 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 Levels identified in the EM&A programme.

Site Inspections & Audits

2.2.6 In addition to air quality, noise and water quality monitoring as a means of assessing the ongoing performance of the Contractor(s), the ET will undertake site inspections of on-site practices and procedures every week. The primary objective of the inspection 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 monthly site audits to assess the performance of the Contractor(s) and the effectiveness of the ET.

2.2.7 Whilst the inspection and audit programme will complement the monitoring activity, the criteria against which inspection/ audits to be undertaken will be derived from the Clauses within the Contract Documents which seek to enforce the recommendations of the EIA Report and the 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 8* 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, Complaints 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 television media and community groups.

2.2.11 Enquiries, complaints and requests for information concerning the environmental effects of the construction works, irrespective of how they are received, will be reported to DSD and the ER and directed to the ET which will set up procedures for the handling, investigation and storage of such information. The following steps will then be followed:

(1) The ET Leader will notify DSD and the ER of the nature of the enquiry.

(2) An investigation will be initiated to determine the validity of the complaint and to identify the source(s) of the issue.

(3) The Contractor(s) will undertake the following steps, as necessary:

- investigate and identify source(s) of the issue;
- if considered necessary by DSD following consultation with the ER and IEC, undertake additional monitoring to verify the existence and severity of the alleged complaint;
- liaise with EPD and IEC to identify remedial measures;
- implement the agreed mitigation measures;
- repeat the monitoring to verify effectiveness of mitigation measures; and
- repeat review procedures to identify further practical areas of improvement if the repeat monitoring results continue to substantiate the complaint.

(4) The outcome of the investigation and the action taken will be documented on a complaint log (see *Annex C*). A formal response to each complaint received will be prepared by the Contractor(s) within five working days and submitted to DSD, in order to notify the concerned person(s) that action(s) has been taken.

(5) Enquires which trigger this process will be reported in the monthly EM&A Reports which will include results of inspections undertaken by the Contractor(s), and details of the measures taken, and additional monitoring results (if deemed necessary). It should be noted that the receipt of complaint or enquiry will not be, in itself, a sufficient reason to introduce additional mitigation measures.

2.2.12 The complainant will be notified of the findings, and audit procedures will be put in place to verify that the issue does not recur.

Reporting

2.2.13 Baseline and impact monitoring, monthly, quarterly and final reports will be prepared by the ET on behalf of DSD and certified by the ET Leader and verified by the IEC. The reports will be submitted to the Contractor(s), ER, DSD and EPD. The monthly EM&A Reports will be prepared and submitted within two weeks of the end of each calendar month**.**

Cessation of EM&A

2.2.14 The cessation of EM&A programme is subject to the satisfactory completion of the Final EM&A Report, agreement with the IEC and approval from EPD.

2.3 Operation Phase EM&A

2.3.1 Based on recommendation from the EIA, audit of landscape and visual impacts are required during the operation phase of the Project.

2.3.2 DSD will manage the operation and maintenance of the Project through Contractor(s). The Contractor(s) shall ensure that all conditions of the EP, including operation phase EM&A, are fulfilled. The ET and IEC commissioned by DSD / Contractors will undertake the EM&A as per requirements listed in *Section 1.6.9* and *Section 1.6.10*, respectively, during operation phase.

3. AIR QUALITY

3.1 Introduction

3.1.1 According to the EIA, no unacceptable air quality impact is anticipated during both construction and operation phases of the Project. Therefore, air and dust monitoring programmes are not considered necessary during either the construction or operation phase. The mitigation measures recommended for dust and odour control are provided in *Annex A*.

3.1.2 Odour nuisance may occur during construction of the Project. An odour monitoring programme is thus recommended during the construction phase to ensure that the construction of the Project will not cause unacceptable odour impact on the Air Sensitive Receivers (ASRs).

3.1.3 In addition, regular environmental site audit is required during the construction phase to ensure the proper implementation of control measures. Detailed site audit requirements are specified in *Section 8*.

3.2 Site Inspection

3.2.1 Weekly site inspection will be undertaken by the ET to ensure that control measures as proposed in the EIA Report are properly implemented to reduce potential air quality impacts during construction.

3.3 Odour Patrol during Construction Phase

3.3.1 Odour patrol should be carried out during the construction phase of the Project.

3.3.2 Monthly odour patrol should be conducted by trained personnel / competent persons (at least 2 odour patrol members). The odour patrol members should:

- 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 free from any respiratory diseases;
- Not be allowed to smoke, eat, drink (except water) or use chewing gum or sweets 30 minutes before and during the odour patrol; and
- 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.

3.3.3 The trained personnel/competent persons should use their nose (olfactory sensors) to sniff odours along the patrol route. The main odour emission sources and the areas affected by the odour nuisance should be identified.

3.3.4 The parameter, location and frequency of odour patrol are summarized in **Table 3.1**.

Table 3.1 Parameter, Location and Frequency for Odour Patrol

Patrol Locations	Patrol Frequency	Parameters
Patrol along Project Site Boundary	Monthly. A total of two times on the monitoring day, in the morning and afternoon, respectively.	Odour Intensity (see **Table 3.2**)

3.3.5 Odour patrol should be carried out along the boundary of the Project Site. The actual patrol routing should be proposed by the ET Leader with reference to the construction works locations and programme, and agreement should be obtained from the ER, the IEC and EPD. The odour patrol schedule should be submitted to ER, the IEC and EPD at least 1 week before the first day of the monitoring month. The ER, IEC and EPD should be notified immediately of any changes in schedule.

3.3.6 The odour intensities detected should be categorised as in **Table 3.2**.

Table 3.2 Odour Intensity Level

Class	Odour Intensity	Description
0	Not Detected	No odour perceived or an odour so weak that it cannot be easily characterised or described.
1	Slight	Identified odour, slight
2	Moderate	Identified odour, moderate
3	Strong	Identified odour, strong
4	Extreme	Severe odour

3.4 Baseline Odour Patrol

3.4.1 Prior to the commencement of construction, a baseline odour patrol should be undertaken in the same manner as the odour patrol during the construction phase, except that the odour patrol should be undertaken weekly for one month before commencement of construction of the Project. The objective of the baseline odour patrol is to provide baseline data for determining any odour impacts during the construction phase of the Project.

3.5 Odour Complaint

3.5.1 When a complaint is received regarding odour nuisance, a complaint log should be triggered within 24 hours and kept with the Contractor. The form should include but not be limited to the following:

- Date and time of the complaint;
- Name and contact information of the complainant;
- Location of where the odour nuisance occurred;

- Characteristics of the odour;
- Odour strength;
- Meteorological conditions including temperature, wind speed, wind direction relative humidity at the time of the complaint; and
- Construction activities carried out at the Project Site at the time the nuisance occurred.

3.5.2 The outcome of the investigation and the action taken will be documented on the complaint log. A formal response to each complaint received will be prepared by the Contractor(s) within five working days and submitted to DSD, in order to notify the concerned person(s) that action(s) has been taken.

3.5.3 Enquires which trigger this process will be reported in the monthly EM&A Reports which will include results of inspections undertaken by the Contractor(s), and details of the measures taken, and additional monitoring results (if deemed necessary). It should be noted that the receipt of complaint or enquiry will not be, in itself, a sufficient reason to introduce additional mitigation measures.

3.6 Action and Limit Levels for Odour Patrol

3.6.1 **Table 3.3** shows the Action and Limit Levels to be used. When the Action and Limit Levels are triggered, investigation should be carried out to identify the cause of exceedance and actions in accordance with the EAP (**see Table 3.4**) should be taken.

Table 3.3 Action and Limit Levels for Odour

	Action Level	**Limit Level**
Perceived odour intensity and odour complaints	• Odour intensity ≥ baseline odour intensity recorded on 1 patrol; or • One documented complaint received	• Odour intensity ≥ baseline odour intensity recorded on 2 consecutive patrols [(a)]
Note: (a) The exceedances of the odour intensity do not need to be recorded at the same location.		

3.7 Event and Action Plan

3.7.1 The ET Leader should take the following actions during construction phase of the Project when Action/Limit Levels are exceeded:

- Inform the IEC, EPD, Contractor, ER and DSD of the exceedance and any known circumstances associated with the exceedance within 24 hours;
- Investigate the cause of exceedance; and
- Implement the EAP as shown in see **Table 3.4**.

Table 3-4 Event / Action Plan for Odour Monitoring during Construction Phase of the Project

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Exceedance of Action Level	• Identify source/ reason of exceedance or complaint • Prepare the odour complaint form or the Notification of Exceedance within 24 hours • Inform DSD, EPD, IEC, ER and Contractor whether the cause of exceedance is due to the Project • Discuss remedial actions with the IEC and the Contractor • Assess effectiveness of Contractor's remedial actions and keep the IEC and Contractor informed of the results	• Review the analysed results submitted by the ET • Review the proposed remedial measures by the Contractor and advise the ER accordingly • Supervise the implementation of remedial measures	• Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; • Make agreement on the mitigation measures to be implemented.	• Rectify any unacceptable practice • Amend working methods as required • Implement amended working methods, if necessary
Exceedance of Limit Level	• Identify source(s)/ reason of exceedance or complaint • Prepare the odour complaint form or the Notification of Exceedance within 24 hours • Inform DSD, EPD, IEC, ER and Contractor whether the cause of exceedance is due to the Project • Assess effectiveness of Contractor's remedial actions and keep the IEC and Contractor informed of the results	• Review the analysed results submitted by the ET • Review the proposed remedial measures by the Contractor and advise the ER accordingly • Supervise the implementation of remedial measures	• Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; • Request Contractor to critically review the working methods; • Make agreement on the mitigation measures to be implemented; • Assess the effectiveness of the implemented mitigation measures.	• Rectify any unacceptable practice • Submit proposals for remedial actions to IEC within 3 working days of notification • Implement the agreed proposal or amend working methods as required • Re-submit proposals if problem still not under control

3.8 Mitigation Measures

Construction Phase

3.8.1 Relevant dust control measures stipulated in the *Air Pollution Control (Construction Dust) Regulation*, and good site practices will be incorporated as the Contract Specifications for implementation throughout the construction period. These include:

- The works area for site clearance and excavation should be sprayed with water before, during and after the operation so as to maintain the entire surface wet.
- Restricting heights from which materials are to be dropped, as far as practicable to reduce the fugitive dust arising from unloading/ loading.
- Immediately before leaving a construction site, all vehicles should be washed to remove any dusty materials from the bodies and wheels. However, all spraying of materials and surfaces should avoid excessive water usage.
- Where a vehicle leaving a construction site is carrying a load of dusty materials, the load should be covered entirely by clean impervious sheeting to ensure that the dusty materials will not leak from the vehicle.
- Erection of hoarding along the site boundary, where appropriate.
- Any stockpile of dusty materials should be covered entirely by impervious sheeting; and/or placed in an area sheltered on the top and three sides.
- All dusty materials should be sprayed with water immediately prior to any loading, unloading or transfer operation so as to maintain the dusty materials wet.
- Reduce the traffic induced dust dispersion and re-suspension, the travelling speed of vehicles within the site should be controlled.
- Regular maintenance of construction equipment deployed on-site should be conducted to prevent black smoke emission.

3.8.2 Excavated nullah bed materials that are placed on trucks for disposal should be properly covered with tarpaulin sheets during transportation to minimise the release of any potential odour. The odorous excavated material should be placed as far away from the sensitive receivers as possible. Odorous river bed material excavated during construction phase should be removed off-site as soon as practicable within 24 hours to avoid any odour nuisance.

Operation Phase

3.8.3 During operation phase, mitigation measures are considered necessary when materials generated from the maintenance works are found to be odorous, and the following measures should be implemented by the Contractor.

- Temporarily stockpile odorous material as far away from ASRs as possible; and

- Temporary stockpiles of odorous material will be properly covered with tarpaulin and should be removed off-site as soon as practically possible within 24 hours to avoid any odour nuisance arising

3.8.4 To reduce odour impacts from the DWF pumping station, the following measures should be implemented.

- The DWF pumping station should be enclosed inside building structure and maintained with negative pressure;
- The DWF pumping station should be equipped with deodourization unit using activated carbon or other equivalent odour removal techniques with odour removal efficiency of 99.5%;
- The exhaust outlet of the deodourization unit should be located in a direction away from the nearby ASRs, with a view to maximizing the separation distance between the exhaust outlet and the nearest ASR; and
- Regular maintenance of the deodourization unit should be conducted to ensure its effectiveness.

4. NOISE

4.1 Introduction

4.1.1 In accordance with the recommendations of the EIA, mitigation measures to control impacts from noise generating works have been the proposed for the construction phase of the Project. Proposed mitigation measures for noise reduction and control are provided in *Annex A*.

4.2 Construction Phase

4.2.1 Noise level monitoring is recommended to ensure compliance with the noise criterion at the Noise Sensitive Receivers (NSRs). Monitoring requirements are detailed below:

Construction Noise Parameters

4.2.2 Due to the utilization of Powered Mechanical Equipment (PME) during the construction phase of the Project, potential noise impact to the NSRs in the vicinity of the Project Site is expected.

4.2.3 Noise measurements should be carried out in accordance with the guidelines given in Annex – General Calibration and Measurement Procedures of Technical Memorandum on Noise from Construction Work other than Percussive Piling (GW-TM).

4.2.4 Construction noise level should be measured in terms of a weighted equivalent continuous sound pressure level (Leq) during the construction phase to check for compliance against limits. Leq (30min) should be used as the monitoring parameter for the construction period between 0700 – 1900 hours on normal working days. For all other time periods, Leq (5min) should be measured for comparison with the Noise Control Ordinance (NCO) criteria. Supplementary information for data auditing (statistical results such as L10 and L90) should also be obtained for reference.

Monitoring Equipment

4.2.5 As referred to in the Technical Memorandum (TM) issued under the Noise Control Ordinance (NCO), sound level meters in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications should be used for carrying out the noise monitoring. Immediately prior to, and following, each noise measurement the accuracy of the sound level meter should be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB. Noise measurements should generally not be made in the presence of fog, rain, wind with a steady speed exceeding 5m s^{-1} or wind with gusts exceeding 10m s^{-1}. The wind speed should be checked with a portable wind speed meter capable of measuring the wind speed in m s^{-1}.

Monitoring Locations

4.2.6 The noise monitoring locations have been shown in **Figure 4.1** and **Table 4.1.** The status and location of noise sensitive receiver (NSR) may change before commencement of construction. If such cases exist, the ET Leader should propose updated noise level monitoring locations and seek approval from the ER and the updated locations must be agreed by the IEC and the EPD.

Table 4.1 Representative Noise Sensitive Receivers (NSRs)

Noise Monitoring Station	NSR ID in EIA	Description	Type of Usage
CM1	NSR01	Tung Tau Wai San Tsuen	Residential
CM2	NSR03	Twin Regency	Residential
CM3	NSR09	Tai Kiu Tsuen	Residential
CM4	NSR14	CCC Chun Kwong Primary School	School
CM5	NSR20	Ma Tin Tsuen - Kung Um Road	Residential

4.2.7 When proposing alternative monitoring location, it should be chosen based on the following criteria:

- Locations that are close to the major site activities which are likely to be affected by elevated noise levels;
- close to the noise sensitive receivers; and
- for monitoring locations located in the vicinity of the sensitive receivers, care should be taken to cause minimal disturbance to the occupants during monitoring.

4.2.8 The monitoring station(s) should normally be at a point 1 m from the exterior of the sensitive receiver building facade and be at a position 1.2 m above the ground. If there is a problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements should be made. For reference, a correction of +3 dB(A) should be made to the free field measurements. The ET Leader should agree with the IEC on the monitoring position and the corrections adopted. Once the positions for the monitoring stations are chosen, the baseline monitoring and the impact monitoring should be carried out at the same position.

4.3 Baseline Monitoring

4.3.1 The ET should carry out baseline noise monitoring prior to the commencement of any construction works. The baseline monitoring should be measured for a continuous period of at least 14 consecutive days at a minimum logging interval of 30 minutes for day-time and 15 minutes (as three consecutive Leq(5min) readings) for evening, holidays and night-time. A schedule of the baseline monitoring should be submitted to the ER, IEC and EPD for agreement before commencement of baseline monitoring.

4.3.2 During the baseline monitoring, there should not be any construction activities in the

vicinity of the monitoring stations. Any non-Project related construction activities in the vicinity of the stations during the baseline monitoring should be noted and the source(s) and location(s) be recorded.

4.3.3 In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET shall liaise with the Engineer's Representative (ER), IEC and EPD to agree on an appropriate set of data to be used as a baseline reference.

4.4 Construction Noise Monitoring

4.4.1 Weekly noise monitoring should be carried out at all the designated monitoring stations to obtain one set of 30-minute measurements between 0700-1900 hours during working days. General construction work carrying out during restricted hours is controlled by CNP system under the NCO. The proposed monitoring schedule should be submitted to ER, the IEC and EPD at least 1 week before the first day of the monitoring month. The ER, IEC and EPD should be notified immediately of any changes in schedule.

4.4.2 In case of non-compliance with the construction noise criteria, more frequent monitoring as specified in the Action Plan in **Table 4.2** shall be carried out. This additional monitoring should be continued until the recorded noise levels are rectified or proved to be irrelevant to the construction activities.

4.5 Event and Action Plan for Noise

4.5.1 The Action and Limit levels for construction noise are defined in **Table 4.2**. Should non-compliance of the noise quality criteria occur, actions in accordance with the Action Plan in **Table 4.3** should be carried out.

Table 4.2 Action and Limit Levels for Construction Noise Monitoring

Time Period	Action Level	Limit Level
0700 – 1900 Hrs on normal weekdays	When one documented compliant is received	▪ 75 dB(A) for residential ▪ 70 dB(A) for schools and 65dB(A) during school examination periods

Table 4.3 Event and Actions for Construction Noise Monitoring

Events	Action			
	ET	**IEC**	**ER**	**Contractor**
When Action Level is reached/exceeded	1. Notify IEC, DSD, EPD, ER and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, DSD, EPD, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness	1. Review the analysed 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. Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; 2. Make agreement on the mitigation measures to be implemented.	1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals
When Limit Level is reached/exceeded	1. Notify IEC, DSD, EPD, ER and Contractor; 2. Identify source; 3. Carry out investigation; 4. Report the results of investigation to the IEC, DSD, EPD, ER and Contractor; 5. Discuss with the Contractor and formulate remedial measures; 6. Increase monitoring frequency to check mitigation effectiveness	1. Review the analysed 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. Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; 2. Request Contractor to critically review the working methods; 3. Make agreement on the mitigation measures to be implemented; 4. Assess the effectiveness of the implemented mitigation measures.	1. Submit noise mitigation proposals to IEC; 2. Implement noise mitigation proposals

4.5.2 In addition, regular environmental site audit is required to ensure the implementation of practical noise control measures, including good site practice, use of quiet PMEs and adoption of mobile noise barriers. Detailed site audit specifications are included in *Section 8* of this EM&A Manual.

4.6 Operation Phase

4.6.1 Unacceptable noise impact is not expected during operation of the Project. Therefore, operational noise monitoring is not considered necessary.

5. WATER QUALITY

5.1 Introduction

5.1.1. In accordance with the recommendations of the EIA, mitigation measures have been proposed during the construction phase of the Project to ensure that unacceptable water quality impacts do not occur at the downstream Water Sensitive Receivers (WSRs) as a result of the construction works. Details of the mitigation measures are presented in Section 6 of the EIA Report. Relevant mitigation measures are presented in *Annex A*.

5.1.2. In addition to the recommended mitigation measures, water quality monitoring should be undertaken during the construction phase of the Project to determine the environmental performance of the Project in terms of its water quality impacts. Appropriate remedial actions should be taken in case the environmental performance criteria are exceeded. Detailed monitoring requirements are presented in the following sections.

5.2 Construction Phase Monitoring

Water Quality Monitoring Parameters

5.2.1 Water quality parameters are chosen for monitoring with consideration of the potential water quality impacts from the construction of the Project (i.e. release of polluted water with high suspended sediment (SS) load from the construction works). This would ensure that potential impacts from construction activities of the Project can be readily detected and timely action could be undertaken to rectify the situation. Water quality parameters to be measured are shown in **Table 5.1**.

Table 5.1 Water Quality Monitoring Parameters and Frequency during the Construction Phase

Parameters	**Unit**	**Monitoring Frequency**		
		Baseline monitoring	**Impact monitoring**	**Post Project monitoring**
***In – situ* Measurement**				
pH	-	3 days per week for 4 weeks prior to the commencement of construction works	3 days per week throughout the construction period	3 days per week for 4 weeks after the completion of construction works
Water temperature	$^{\circ}C$			
Turbidity	NTU			
Dissolved Oxygen (DO)	mg/L			
Dissolved Oxygen (DO)	% saturation			
Salinity	$^{0}/_{00}$			
Laboratory Analysis				
Suspended Solids (SS)	mg/L			

Notes:
For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb.

5.2.2 In addition to the water quality parameters, other relevant data should also be measured and recorded in field logs, including the coordinates of the sampling stations and the location of construction works at the time of sampling, tidal stages, water depth, sampling depth,

weather conditions, flowrate (m^3/day), special phenomena (provide photographs if appropriate) and work activities undertaken around the monitoring and works area that may influence the monitoring results.

Water Quality Monitoring Equipment

5.2.3 For water quality monitoring, the following equipment should be supplied and used by the environmental contractor.

5.2.4 ***Dissolved Oxygen, Temperature and Salinity Measuring Equipment*** - The instrument should be a portable, weatherproof measuring instrument complete with cable, sensor, comprehensive operation manuals, and should be operable from a DC power source. It should be capable of measuring: dissolved oxygen levels in the range of 0–20 mg L^{-1} and 0-200% saturation; a temperature of 0-45 °C; and a salinity of 0-35 ppt.

5.2.5 It should 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 cable should be available for replacement where necessary (for example, YSI model 59 meter, YSI 5739 probe, YSI 5795A submersible stirrer with reel and cable or an approved similar instrument).

5.2.6 ***Turbidity Measurement Instrument*** - Turbidity should be measured *in situ* by the nephelometric method using an instrument that is portable and weatherproof using a DC power source with cable, sensor, and comprehensive operation manuals. This instrument should have a photometric sensor capable of measuring turbidity between 0 - 1000 NTU (e.g. Hach model 2100P or other approved instrument of similar type). The meter should be calibrated in order to establish the relationship between NTU units and the levels of SS. The turbidity measurement should be carried out on a split water sample from the same water sample collected for suspended solids analysis.

5.2.7 ***pH Measuring Equipment -*** A portable pH meter capable of measuring a range between 0.0 and 14.0 should be provided to measure pH under the specified conditions (e.g. Orion Model 250A or an approved similar instrument).

5.2.8 ***Electromagnetic Flow Meter -*** A hand-held digital electromagnetic flow meter (e.g. model Flo-mate 2000 or other approved similar instrument) should be provided and used to measure water flow rate during water quality monitoring. The measurement should be conducted at fixed sampling points and water depth throughout the monitoring programme.

5.2.9 ***Positioning Device*** - A hand-held Global Positioning System (GPS) with way point bearing indication or other equivalent instrument of similar accuracy will be provided and used during monitoring to ensure the monitoring team is at the correct location before taking measurements.

5.2.10 ***Water Depth Gauge -*** A portable, battery-operated echo sounder will be used for the determination of water depth at each designated monitoring station.

5.2.11 ***Water Sampling Equipment*** - A water sampler, consisting of a transparent PVC or glass cylinder of at least 500ml, which can be effectively sealed at both ends, should be used (Kahlsico Water Sampler 13SWB203 or an approved similar instrument). Water samples for SS, BOD_5 measurements should be contained in high density polyethene bottles.

5.2.12 ***Back-up Equipment*** **-** Sufficient stocks of spare parts should be maintained for replacements when necessary. Back-up monitoring equipment should also be available so that monitoring can proceed uninterrupted even when some equipment is under maintenance, calibration, etc.

Sampling / Testing Protocols

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

5.2.14 For the on-site calibration of field equipment, the BS 1427: 1993, Guide to Field and On-Site Test Methods for the Analysis of Waters should be observed. Sufficient stocks of spare parts should be maintained for replacements when necessary. Backup monitoring equipment should also be made available so that monitoring can proceed uninterrupted even when equipment is under maintenance, calibration etc.

5.2.15 Water samples for SS measurements should be collected in high density polythene bottles, packed in ice (cooled to 4° C without being frozen), and delivered to a HOKLAS laboratory as soon as possible after collection.

5.2.16 Three replicate samples should be collected from each of the monitoring events for *in situ* measurement and lab analysis. It is recommended to take three replicates at each sampling station from each independent sampling event for all parameters in order to ensure a robust statistically interpretable data set.

Laboratory Analysis

5.2.17 All laboratory work should be carried out in a HOKLAS accredited laboratory. Water samples of about 1,000ml should be collected at the monitoring and control stations for carrying out the laboratory determinations. The determination work should start within the next working day after collection of the water samples. The SS laboratory measurements should be provided within 2 days of the sampling event (48 hours). The analyses should follow the standard methods as described in APHA Standard Methods for the Examination of Water and Wastewater, 21st Edition, unless otherwise specified (APHA 2540D for SS).

5.2.18 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 should be in accordance with requirements of HOKLAS or another internationally accredited scheme.

Monitoring Locations

5.2.19 The monitoring stations have been established to identify potential water quality impacts to WSRs. Locations of the monitoring stations are shown in **Figure 5.1** with the co-ordinates presented on **Table 5.2**. These monitoring stations are confirmed to be accessible by land. Descriptions of the monitoring stations are as follows:

- W1 is Impact Station while W2 is Impact Station or Control Station depending on tidal condition. These stations are downstream of the boundary of the Project Site at which construction activities of the nullah bed end. W1 is located at the Shan Pui River and is approximately 250 m from the boundary of works, while W2 is located near the Mai Po Inner Deep Bay Ramsar Site and is approximately 2 km from the boundary. Water quality monitoring at these two Stations will help to determine any adverse water quality impacts to the nearest Water Sensitive Receivers which may be caused by the Project's construction activities.

- C1 and C2 are Control Stations which are approximately 500m upstream of the Project Site and not supposed to be influenced by the construction works. These stations are not affected by tidal condition of Shan Pui River. Water quality monitoring data collected at C1 and C2 will be used to compare with the Impact Stations' data to determine any adverse water quality impacts as a result of the construction works of the Project.

- Mobile Stations should also be monitored for which the location will be determined in accordance with the boundary and number of the active works area during the time of impact monitoring. The Upstream Mobile Station should be located about 50 m upstream of the active works area while the Downstream Mobile Station should be located about 50 m downstream of the active works area.

Table 5.2 Locations of Water Quality Monitoring Stations for the Construction Phase Monitoring

Station	Description	Station Nature		Easting	Northing
		Mid-ebb	**Mid-flood**		
W1	Shan Pui River	Impact Station		821322	835217
W2	Shan Pui River near Mai Po Inner Deep Bay Ramsar Site	Impact Station	Control Station	820935	837158
C1	Kung Um Road Nullah	Control Station*		820694	833151
C2	San Hui Nullah	Control Station*		820876	833173
UM	Yuen Long Town Nullah	Upstream Mobile Station (Control)*		Located 50 m upstream of the active works area. Location to be determined on-site.	
DM	Yuen Long Town Nullah	Downstream Mobile Station* (Impact)		Located 50 m downstream of the active works area. Location to be determined on-site.	

* Not affected by tidal condition

5.2.20 The locations and suitability of the proposed monitoring stations above are for reference only and shall be reviewed and proposed by the ET and confirmed with the IEC and the EPD before commencement of Baseline Monitoring. The water depth in the Yuen Long Town Nullah and Shan Pui River may not be sufficient to take samples at different depths, especially during dry season or due to tidal action. Therefore, water samples should only be taken at mid-depth. Water sampling works should be conducted with caution to avoid disturbing the bottom sediment.

Monitoring Frequency

5.2.21 As specified in **Table 5.1**, the detailed monitoring frequency requirements are listed below.

Baseline Monitoring

5.2.22 Baseline monitoring should be undertaken three times per week for four weeks at the designated stations except the Mobile Stations prior to the commencement of the construction works. For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb. The interval between two consecutive sets of monitoring should not be less than 36 hours. Baseline monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD one week prior to the commencement of baseline monitoring.

Impact Monitoring

5.2.23 Impact monitoring should be undertaken three times per week during the course of construction works. For monitoring stations affected by tidal condition, monitoring should be carried out at mid-flood and mid-ebb. The interval between two consecutive sets of monitoring should not be less than 36 hours except when there are exceedances of Action and/or Limit Level, in which case monitoring frequency should be increased. The proposed water quality monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD at least one week before the first day of the monitoring month. The ER, the IEC and EPD should be notified immediately of any changes in schedule.

Post Project Monitoring

5.2.24 Post Project Monitoring will comprise sampling on three days a week for four weeks after completion of the construction works. The monitoring requirements will be the same as the Baseline Monitoring stated in *Section 5.2.22* above. The salinity monitoring results shall be compared with the typical salinity range of 0.2 – 29.5 psu in Deep Bay specified in the EIA Report or updated baseline data obtained. Post Project monitoring schedule prepared by the ET should be submitted to the ER, the IEC and EPD one week prior to the commencement of Post Project monitoring.

Event and Action Plan

5.2.25 Water quality monitoring results will be evaluated against Action and Limit Levels shown in **Table 5.3**.

Table 5.3 Action and Limit Level for Water Quality Monitoring during the Construction Phase of the Project (based on the result of the Baseline Report)

Parameter	Action Level	Limit Level
SS in mg/L (1)	95%-ile of baseline data, or 20% exceedance of value at any impact station compared with corresponding data from control station on the same day	99%-ile of baseline data, or 30% exceedance of value at any impact station compared with corresponding data from control station on the same day
DO in mgL^{-1} (2)	5%-ile of baseline data	4 mg/L or 1%-ile of baseline data
Turbidity in NTU (1)	95%-ile of baseline data, or 20% exceedance of value at any impact station compared with corresponding data from control station on the same day	99%-ile of baseline data, or 30% exceedance of value at any impact station compared with corresponding data from control station on the same day

Notes:

(1) For SS and turbidity, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.

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

5.2.26 Should the monitoring results of the water quality parameters at any designated monitoring stations indicate that the water quality criteria are exceeded, the actions in accordance with the Event and Action Plan in **Table 5.4** should be carried out.

5.2.27 In addition to monitoring, regular environmental site audit is required to ensure the proper implementation of good site practices, construction runoff pollution prevention measures, drainage and sewage control measures.

Table 5.4 Event and Action Plan for Water Quality Monitoring during the Construction Phase of the Project

Event	ET Leader	IEC	ER	Contractor
Action level being exceeded	• Repeat measurement to confirm findings; • Identify source(s) of impact; • Inform DSD, IEC, Contractor, ER and EPD; • Check monitoring data, all plant, equipment and Contractor's working methods; • Discuss mitigation measures with DSD, IEC , ER and Contractor; • Repeat measurement on next day of exceedance.	• Discuss with DSD, ET, ER and Contractor on the mitigation measures; • Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; • Assess the effectiveness of the implemented mitigation measures.	• Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; • Make agreement on the mitigation measures to be implemented.	• Inform the ER and confirm notification of the non-compliance in writing; • Rectify unacceptable practice; • Check all plant and equipment • Consider changes of working methods; • Discuss with ET, IEC and ER and propose mitigation measures to IEC and ER; • Implement the agreed mitigation measures.
Limit level being exceeded	• Repeat measurement to confirm findings; • Identify source(s) of impact; • Inform DSD, IEC, Contractor, ER and EPD; • Check monitoring data, all plant, equipment and Contractor's working methods; • Discuss mitigation measures with DSD, IEC, ER and Contractor; • Ensure mitigation measures are implemented; • Increase the monitoring frequency to daily until no exceedance of Limit level.	• Discuss with DSD, ET, ER and Contractor on the mitigation measures; • Review proposals on mitigation measures submitted by Contractor and advise the ER accordingly; • Assess the effectiveness of the implemented mitigation measures.	• Discuss with DSD, IEC, ET and Contractor on the proposed mitigation measures; • Request Contractor to critically review the working methods; • Make agreement on the mitigation measures to be implemented; • Assess the effectiveness of the implemented mitigation measures.	• Inform the ER and confirm notification of the non-compliance in writing; • Rectify unacceptable practice; • Check all plant and equipment; • Consider changes of working methods; • Discuss with ET , IEC and ER and propose mitigation measures to IEC and ER within 3 working days; • Implement the agreed mitigation measures.

6. WASTE MANAGEMENT

6.1.1. Construction and demolition (C&D) materials will inevitably be produced during the construction phase of the Project. Waste generated during construction works includes construction and demolition materials, chemical waste, general refuse and floating refuse. Waste types, quantities and timing have been estimated and mitigation measures have been proposed in terms of avoidance-minimisation-reuse-recycling-disposal hierarchy.

6.1.2. Potential for reuse of inert C&D material (public fill) from the Project will be rigorously explored during the detailed design stage in an effort to minimise off-site disposal. Provided that there is strict control of C&D materials generated from construction works and that all arising materials are stored, handled, transported and disposed of in accordance with the recommended mitigation measures, potential impact is not expected.

6.1.3. The recommended waste management measures shall be enforced by incorporating them into an Environmental Management Plan (EMP) to be prepared by the Contractor. Environmental audit would be necessary to ensure the implementation of proper waste management practices during construction.

6.1.4. Auditing should be carried out periodically to determine if waste is being managed in accordance with the relevant environmental legislation and standards (e.g. Waste Disposal Ordinance) and the EMP. The audits should examine all aspects of waste management including waste generation, storage, recycling, treatment, transportation, and disposal. The general site inspections including waste management issues will be undertaken weekly by ET to check all construction activities for compliance with all appropriate environmental protection and pollution control measures, including those set up in the EMP. Meanwhile, waste management audit should also be carried out on monthly basis by the IEC.

6.1.5. Unacceptable impacts related to waste management are not expected during operation of the Project. As such, environmental monitoring is not considered necessary during operation of the Project.

7. LANDSCAPE AND VISUAL

7.1 Introduction

7.1.1. The EIA study has recommended to undertake an EM&A programme for the landscape and visual aspects during the design, construction and operation phases of the Project. The design, implementation and maintenance of landscape mitigation measures is a key aspect of the Project and should be checked to ensure that they are fully realised and that potential conflicts between the proposed landscape measures and any other Project works and operational requirements are resolved at the earliest possible date and without compromise to the intention of the mitigation measures. In addition, implementation of the mitigation measures recommended in the EIA will be monitored through the site audit programme.

7.2 Mitigation Measures

Construction Phase

7.2.1 The following mitigation measures should be implemented during the construction phase of the Project.

ID	Mitigation Measures	Funding Agency	Implementation Agency
CM1	Good site practice Construction site should be kept clean and tidy and construction material should be stored in order. Canvas sheets should be used to cover the exposed earth. Unused construction and demolition (C&D) debris should be removed as soon as the reinstatement works are completed.	DSD	DSD / Contractor
CM2	Erection of decorative screen hoarding Each site should be provided with decorative screen hoarding compatible with surrounding setting.	DSD	DSD / Contractor
CM3	Tree preservation The existing trees shall be preserved as far as possible. The retained existing trees on site shall be protected carefully during construction. The requirement specified in "Guidelines on Tree Preservation during Development" issued by Development Bureau shall be followed. Tree preservation should include protection measures for existing trees and greenery.	DSD	DSD / Contractor
CM4	Tree transplanting / compensatory tree planting According to the latest design, all trees will be preserved and no tree felling is expected. In case of trees unavoidably affected by the Project during construction, tree transplanting shall be conducted as far as possible. Any unavoidable tree felling shall be mitigated by compensatory tree planting.	DSD	DSD / Contractor

Operation Phase

7.2.2 The following mitigation measures should be implemented during the operation phase of the Project:

ID	Mitigation Measures	Funding Agency	Implementation Agency	Maintenance/ Management Agency
OM1	A minimum lighting will be maintained at night time as general lighting provision for security reason.	DSD	DSD / Contractor	DSD
OM2	Green roof and shrub planting will be provided for the DWF pumping station. The roof structure will be planted with trees and groundcovers to reduce glaring effect and give a green appearance of the roof structure. Shrub planting is proposed to be planted within the site boundary to further enhance the development with lush greenery.	DSD	DSD / Contractor	DSD
OM3	Vertical greening will be provided on the external walls without the coverage of architectural elements.	DSD	DSD / Contractor	DSD
OM4	The proposed architectural design of the DWF pumping station will utilize the surrounding landscape to blend the buildings with the surrounding environment. The building will maintain a low profile to reduce the visual impact.	DSD	DSD / Contractor	DSD

7.3 Baseline Monitoring

7.3.1 A photographic record of the Project Site at the time of the Contractor's possession should be prepared by the Contractor and approved by the ER. The approved photographic record should be submitted to the Project Proponent, ET, IEC and EPD for record.

7.4 Construction and Post-Construction Phase Audit

7.4.1 A specialist Landscape Sub-Contractor should be employed by the Contractor for the implementation of landscape construction works and subsequent maintenance operations during the 12-month establishment period.

7.4.2 All measures undertaken by both the Contractor and the specialist Landscape Sub-Contractor during the construction phase and first year of the operational phase should be audited by a Registered Landscape Architect, as a member of the ET, on a regular basis to ensure compliance with the intended aims of the measures. 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 broad scope of the audit is detailed below but should also be undertaken with reference to the more specific checklist provided in **Table 7.1**. Operational phase auditing will be restricted to the 12 months of the establishment works of the landscaping proposals and thus only the items below concerning this period are relevant to the operational phase.

- 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, including any damage to existing trees should be noted;

- All existing trees and vegetation within the study area which are not directly affected by the works are retained and protected;
- The methods of protecting existing vegetation proposed by the Contractor are acceptable and enforced;
- Preparation, lifting transport and re-planting operations for any transplanted trees are conducted in accordance with the approved methodology;
- The planting of new trees, shrubs, groundcover, climbers, ferns, grasses and other plans, together with the replanting of any transplanted trees are carried out properly and within the right season; and
- All necessary horticultural operations and replacement planting are undertaken throughout the Establishment Period to ensure the healthy establishment and growth of both transplanted trees and all newly established plants.

Table 7.1 Construction/Post-Construction Phase Audit Checklist

Area of Works	Items to be Monitored
Advance planting	Monitoring of implementation and maintenance of planting, and against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Protection of all trees to be retained	Identification and demarcation of trees / vegetation to be retained, erection of physical protection (e.g. fencing), monitoring against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Clearance of existing vegetation	Identification and demarcation of trees / vegetation to be cleared, checking of extent of works to minimise damage, monitoring of adjacent areas against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Transplanting of trees	Identification and demarcation of trees / vegetation to be transplanted, monitoring of extent of pruning / lifting works to minimise damage, timing of operations, implementation of all stages of preparatory and translocation works, and maintenance of transplanted vegetation, etc.
Plant supply	Monitoring of operations relating to the supply of specialist plant material (including the collecting, germination and growth of plants from seed) to ensure that plants will be available in time to be used within the construction works.
Soiling, planting, etc.	Monitoring of implementation and maintenance of soiling and planting works and against possible incursion, physical damage, fire, pollution, surface erosion, etc.
Decorative treatment of site hoarding	Implementation and maintenance of mitigation measures, to ensure compliance with agreed designs.
Architectural design and treatment including visually recessive designs, materials, textures and colours.	Implementation and maintenance of mitigation measures, to ensure compliance with agreed designs.
Establishment Works	Monitoring of implementation of maintenance operations during Establishment Period

7.4.3 In the event of non-conformity the responsibilities of the relevant parties are detailed in the Event /Action plan provided on **Table 7.2**.

Table 7.2 Event / Action Plan

Action Level	ET Leader	IEC	ER	Contractor
Non-conformity Identified	1. Inform Contractor, IEC and ER 2. Discuss remedial measures with IEC, ER and Contractor 3. Monitor remedial measures until rectification has been completed	1. Check the Contractor's working method 2. Discuss with ETL and Contractor on possible remedial measures 3. Advise ER on effectiveness of proposed remedial measures. 4. Check implementation of remedial measures.	1. Ensure remedial measures are properly implemented	1. Amend working methods 2. Propose remedial measures 3. Rectify non-conformity and undertake any necessary remedial measures.

8. CONSTRUCTION SITE AUDIT

8.1 Site Inspection

8.1.1 Site inspection should be undertaken regularly in order to inspect the construction activities and ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented.

8.1.2 The ET Leader should be responsible for formulating the environmental site inspection, deficiency and action reporting system, and for carrying out the site inspection works. The ET Leader should submit a proposal on the site inspection, deficiency and action reporting procedures to the Contractor for agreement and to the IEC and ER for approval.

8.1.3 Regular site inspections should be carried out at once per week. The areas of inspection should not be limited to the environmental situation, pollution control and mitigation measures within the site. It should also review the environmental situation outside the works area which is likely to be affected, directly or indirectly, by the construction activities of the Project. The ET Leader should make reference to the following information in conducting the inspection:

a) Recommendations in the EIA study on environmental protection and pollution control mitigation measures;

b) On-going result of the EM&A programme;

c) Works progress and programme;

d) Individual works methodology proposals (which should include proposal on associated pollution control measures);

e) The contract specifications on environmental protection;

f) Relevant environmental protection and pollution control laws; and

g) Previous site inspection results.

8.1.4 The Contractor should update the ET Leader with all relevant information of the construction contract for the ET Leader to carry out the site inspections. The inspection results and its associated recommendations on improvements to the environmental protection and pollution control works should be submitted to the ER, Contractor and IEC within 24 hours, for reference and for taking immediate action. The Contractor should follow the procedures and time-frame as stipulated in the environmental site inspection, deficiency and action reporting system

formulated by the ET Leader to report on any remedial measures subsequent to the site inspections.

8.1.5 The ET should also carry out ad hoc site inspections if significant environmental problems are identified. Inspections may also be required subsequent to receipt of an environmental complaint, or as part of the investigation work, as specified in the Action Plan for environmental monitoring and audit.

8.2 Compliance with Legal & Contractual Requirements

8.2.1 In order to ensure that all construction site works are in compliance with the environmental requirements, all the works method statements submitted by the Contractor to the ER for approval should be sent to the ET Leader for vetting.

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

8.2.3 The Contractor should regularly copy relevant documents to the ET Leader so that the inspection can be carried out smoothly. The document should include but not limited to the Work Progress Reports, updated Works Programme, and application letters for different licences / permits under the environmental protection laws, and copies of all the valid licences / permits held at that time. The site diary should also be available for the ET Leader's inspection upon request.

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

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

8.3 Environmental Complaints

24-hour Dedicated Hotline for Public Complaints and Enquiries

8.3.1 The Contractor should set up a 24-hour hotline dedicated to the Project to receive and respond to complaints or enquires from the public, media, and community groups in the vicinity of the site throughout the construction period of the Project. The Contractor should display conspicuously the telephone number of the 24-hour

hotline on the construction site(s) at all vehicular site entrances / exits or at a convenient location for public information at all times.

Environmental Complaints

8.3.2 Complaints should be referred to the ET Leader for carrying out complaint investigation procedures. The ET Leader should undertake the following procedures upon receipt of any complaint:

1. Log complaint and date of receipt onto the complaint database and inform the IEC immediately;

2. Investigate the complaint to determine its validity, and to assess whether the source of the problem is due to works activities;

3. Identify mitigation measures in consultation with the IEC if a complaint is valid and due to works;

4. Advise the Contractor accordingly if mitigation measures are required;

5. Review the Contractor's response on the identified mitigation measures, and the updated situation;

6. If the complaint is transferred from EPD, submit interim report to EPD after endorsement by IEC on status of the complaint investigation and follow-up action within the time frame assigned by EPD;

7. Undertake additional monitoring and audit to verify the situation if necessary, and review that circumstances leading to the complaint do not recur;

8. Report the investigation results and the subsequent actions to the complainant (If the source of complaint is EPD, the results should be reported within the time frame assigned by EPD); and

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

8.3.3 During the complaint investigation work, the Contractor and ER should cooperate with the ET Leader in providing all the 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. The ER should ensure that the measures have been carried out by the Contractor.

8.3.4 A sample Complaint Log is provided in *Annex C*.

9. REPORTING

9.1 General

9.1.1 EM&A reports can be provided in an electronic medium upon agreement with DSD and EPD on the format. The monitoring data (baseline and impact) should also be made available through an internet website that is agreed with relevant authority.

9.1.2 The ET Leader should prepare and submit the following reports:

- Baseline Monitoring Report;
- Monthly EM&A Reports;
- Quarterly EM&A Summary Reports; and
- Final EM&A Review Report.

9.1.3 In accordance with Annex 21 of the EIAO-TM, the monthly, quarterly summary and final review EM&A reports should be made available to the Director of Environmental Protection (DEP).

9.2 Baseline Monitoring Report

9.2.1 The ET should prepare and submit a Baseline Monitoring Report no less than 2 weeks before commencement of the works for the Project for agreement on the A/L Levels. Copies of the Baseline Monitoring Report should be submitted to the Contractor(s), the IEC, ER, DSD and EPD as appropriate. The ET should liaise with the relevant parties to confirm the exact number of copies required.

9.2.2 The Baseline Monitoring Report for the construction phase should cover the baseline odour and noise levels as well as water quality. It will include the following as a minimum:

(1) Up to half a page executive summary;
(2) Brief project background information;
(3) Drawings showing locations of the baseline monitoring stations;
(4) Monitoring results (in both hard and diskette copies) together with the following information:
    a. monitoring methodology;
    b. name of laboratory and types of equipment used and calibration details;
    c. parameters monitored;
    d. monitoring locations (and depth if applicable);
    e. monitoring date, time, frequency and duration; and
    f. QA/QC results and detection limits.
(5) Details on influencing factors, including:
    a. major activities, if any, being carried out on the site during the period;
    b. weather conditions during the period; and

c. other factors which might affect the results.

(6) Determination of the A/L Levels for each monitoring parameter and statistical analysis of the baseline data, the analysis shall conclude if there is any significant difference between control and impact stations for the monitored parameters;

(7) Revisions for inclusion in the EM&A Manual; and

(8) Comments, recommendations and conclusions.

9.3 Monthly EM&A Reports

9.3.1 The results and findings of the construction phase EM&A work required in this Manual will be recorded in the Monthly EM&A Reports prepared by the ET Leader. The EM&A report should be prepared and submitted within 2 weeks of the end of each reporting month, with the first report due the month after construction commenced. Each Monthly EM&A Report should be submitted to the following parties: the Contractor(s), the IEC, ER, DSD and the EPD, as well as to other relevant departments as required. Before submission of the first Monthly EM&A Report, the ET should liaise with the parties on the exact number of copies and format of the reports in both hard copy and electronic medium.

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

9.3.3 Contents of First Monthly EM&A Report should at least include the following:

(1) Executive summary (1-2 pages), comprising:
   a. breaches of AL levels;
   b. complaint Log;
   c. notifications of any summons and successful prosecutions;
   d. reporting changes; and
   e. forecast of impact predictions.

(2) Basic project information including a synopsis of the project organisation, programme and management structure.

(3) Environmental Status, comprising:
   a. works undertaken during the month with illustrations; and
   b. drawing showing the project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(4) A brief summary of EM&A requirements including:
   a. monitoring parameters;
   b. environmental quality performance limits (A/L levels);
   c. EAPs;
   d. environmental mitigation measures, as recommended in the EIA Report; and
   e. environmental requirements in contract documents.

(5) Advice on the implementation of environmental protection, mitigation and pollution control measures as recommended in the EIA Report and summarised in the updated implementation schedule.
(6) Monitoring results (in both hard and diskette copies) together with the following information;
   a. monitoring methodology;
   b. name of laboratory and equipment used and calibration details;
   c. parameters monitored;
   d. monitoring locations (and depth); and
   e. monitoring date, time, frequency, and duration;
(7) Graphical plots of trends of monitored parameters for representative monitoring stations annotated against the following:
   a. major activities being carried out on site during the period;
   b. weather conditions during the period; and
   c. any other factors which might affect the monitoring results;
(8) Advice on the solid and liquid wastes management.
(9) A summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels).
(10) A review of the reasons for and the implications of non-compliance including a review of pollution sources and working procedures.
(11) A description of the actions taken in the event of non-compliance and deficiency reporting and any follow-up procedures related to earlier non-compliance.
(12) A summary record of complaints received (written or verbal) for each media, including locations and nature of complaints, liaison and consultation undertaken, actions and follow-up procedures taken and summary of complaints.
(13) A summary record of notifications of summons, successful prosecutions for breaches of environmental protection/pollution control legislation and actions to rectify such breaches.
(14) A forecast of the works programme, impact predictions and monitoring schedule for the next one month; and
(15) Comments, recommendations and conclusions for the monitoring period.

9.3.4 Contents of the Subsequent Monthly EM&A Reports shall at least include the following:
(1) Executive summary (1-2 pages), including:
   a. breaches of A/L levels;
   b. complaint log;
   c. notifications of any summons and successful prosecutions;
   d. reporting changes; and
   e. forecast of impact predictions.
(2) Environmental status, comprising:
   a. drawing showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations;

b. summary of non-compliance with the environmental quality performance limits; and
c. summary of complaints.

(3) Environmental issues and actions, comprising:
a. review issues carried forward and any follow-up procedures related to earlier non-compliance (complaints and deficiencies);
b. description of the actions taken in the event of non-compliance and deficiency reporting;
c. recommendations (should be specific and target the appropriate party for action); and
d. implementation status of the mitigation measures and the corresponding effectiveness of the measures.

(4) Appendices, including:
a. A/L levels;
b. graphical plots of trends of monitored parameters at key stations over the past reporting month for representative monitoring stations annotated against the following: major activities being carried out on site during the period; weather conditions during the period; and any other factors which might affect the monitoring results;
c. monitoring schedule for the present and next reporting period;
d. cumulative complaints statistics; and
e. details of complaints, outstanding issues and deficiencies.

9.4 Quarterly EM&A Summary Reports

9.4.1 The ET Leader should submit Quarterly EM&A Summary Reports for the construction phase EM&A works only. These reports should contain at least the following information:

(1) Executive summary (up to half a page).
(2) Basic project information including a synopsis of the Project organisation, programme, contacts of key management, compliance with EP condition (status of submission) and a synopsis of work undertaken during the quarter.
(3) A brief summary of EM&A requirements including:
a. monitoring parameters;
b. environmental quality performance limits (A/L levels); and
c. environmental mitigation measures, as recommended in the EIA Report.
(4) Advice on the implementation of environmental protection and pollution control/mitigation measures as recommended in the EIA Report and summarised in the updated Implementation Schedule.
(5) Drawings showing the Project area, any environmental sensitive receivers and the locations of the monitoring and control stations.

(6) Graphical plots of the trends of monitored parameters over the past four months (the last month of the previous quarter and the present quarter) for representative monitoring stations annotated against:
   a. the major activities being carried out on site during the period;
   b. weather conditions during the period; and
   c. any other factors which might affect the monitoring results.

(7) Advice on the solid and liquid wastes management.

(8) A summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels).

(9) An Impact Prediction Review will be prepared to compare project predictions with actual impacts for the purpose of assessing the accuracy of predictions on the EIA study. The review will focus on the comparison between the EIA study prediction with the EM&A monitoring results. If any excessive variation was found, a summary of investigation and follow up procedure taken should be addressed accordingly.

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

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

(12) A summarised record of complaints received (written or verbal) for each media, liaison and consultation undertaken, actions and follow-up procedures taken.

(13) 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.

(14) Proponents' contacts for the public to make enquiries.

9.5 Final EM&A Review Report

9.5.1 A Final EM&A Review Report should be prepared by the ET at the end of the construction phase. The Final EM&A Review Reports should contain at least the following information:

(1) Executive Summary (1-2 pages).

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

(3) Basic project information including a synopsis of the project organization, contacts for key management staff and a synopsis of work undertaken during the course of the Project.

(4) A brief summary of EM&A requirements including:
   a. environmental mitigation measures as recommended in the EIA Report;
   b. environmental impact hypotheses tested;
   c. environmental quality performance limits (A/L Levels);
   d. monitoring parameters; and
   e. EAPs.

(5) A summary of the implementation status of environmental protection and pollution control/mitigation measures as recommended in the EIA Report and summarised in the updated Implementation Schedule.

(6) Graphical plots and the statistical analysis of the trends of monitored parameters over the course of the project including the post-project monitoring for monitoring stations annotated against the following:

a. the major activities being carried out on site during the period;
b. weather conditions during the period; and
c. any other factors which might affect the monitoring results;

(7) A summary of non-compliance (exceedances) of the environmental quality performance limits (A/L levels).

(8) A review of the reasons for and the implications of non-compliance including review of pollution sources and working procedures as appropriate.

(9) A description of the actions taken in the event of non-compliance.

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

(11) A summary record of notifications of summonses 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.

(12) A comparison of the EM&A data with the EIA predictions with annotations and explanations for any discrepancies, including a review of the validity of EIA predictions and identification of shortcomings in the EIA recommendations.

(13) A review of the monitoring methodology adopted and with the benefit of hindsight, comment on its effectiveness, including cost effectiveness;

(14) A review of the success of the EM&A programme, including a review of the effectiveness and efficiency of the mitigation measures, and recommendations for any improvements in the EM&A programme.

(15) A clear cut statement on the environmental acceptability of the project with reference to specific impact hypotheses and a conclusion to state the return to ambient and/or the predicted scenario as the EIA findings.

9.6 Data Keeping

9.6.1 Though documents including the field monitoring records, laboratory analysis records, and site inspection forms are not required to be included in the EM&A Reports for submission, they should be kept by the ET Leader and ready for inspection upon request. Relevant information should be clearly and systematically recorded in the documents.

9.6.2 Monitoring data should be recorded in magnetic media, and the software copy should be available upon request. The documents and data should be kept for at least one year after the completion of the construction phase EM&A works.

9.7 Electronic Reporting of EM&A Information

9.7.1 To enable the public inspection of the Baseline Monitoring Report and Monthly EM&A Reports via the EIAO Internet Website and at the EIAO Register Office, electronic copies of Monthly EM&A Reports should be prepared in Hyper Text Markup Language (HTML) (version 4.0 or later) and in Portable Document Format (PDF, version 4.0 or later), unless otherwise agreed by EPD and should be submitted at the same time as the hard copies. For the HTML version, a content page capable of providing hyperlink to each section and sub-section of the EM&A Reports should be included in the beginning of the document. Hyperlinks to figures, drawings and tables in the EM&A Reports should be provided in the main text where the respective references are made. Graphics in the reports should be in interlaced GIF format unless otherwise agreed by EPD. The content of the electronic copies of the Monthly EM&A Reports must be the same as the hard copies.

9.7.2 The environmental monitoring data should be made available to the public via the EIAO Internet Website and the EIAO Register Office.

9.7.3 The internet website as described above will enable user-friendly public access to the monitoring data and with features capable of:

- providing access to environmental monitoring data collected since the commencement of works;
- searching by data;
- searching by types of monitoring data;
- hyperlinks to relevant monitoring data after searching; and
- or otherwise as agreed by EPD.

9.8 Interim Notifications of Environmental Quality Limit Exceedances

9.8.1 With reference to EAPs, when the environmental quality limits are exceeded, the ET should notify the IEC, Contractor(s), ER, DSD and EPD as appropriate within 24 hours of the identification of the exceedance. The notification should be followed up with each party on the results of the investigation, proposed remediation action and success of the action taken, with any necessary follow-up proposals. A sample template for the notification is provided in *Annex D*.

END OF TEXT